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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

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California's Golden Jubilee.

The California Golden Jubilee is being arranged with due regard to all requisite details. The general spirit and purpose of the occasion is shown in the address issued by the committee, signed by the presidents of the various organizations. It well says: "The event to be commemorated is one of wide-reaching importance and of long-enduring interest. It made a vast industrial revolution and aroused the human mind to higher activity.

"Fifty years ago the Pacific half of the earth, the vast region that sends its waters from the slopes of four continents to the greatest of oceans, was bound in the bonds of savagery or torpidity. Its quiet was not disturbed by the whistle of the railway or the cry of the newsboy—two of the characteristic symbols of civilization. Australia was a prison pen; Japan a recluse; the only ships that visited California or the coast to the northward came for hides, whales or furs, and the other shores of our ocean were nearly as dull.

"Marshall's shout that he had found gold echoed and re-echoed so loudly through all civilized countries that they were aroused to an activity previously unknown. California sprang at once into a high state of enlightenment. She not only developed her own mineral wealth with magical speed, but by her missionaries of the pick and pan she opened the mines of our coast from Arizona to Alaska, and even those of Australia. She poured out more than $1,500,000,000 of her own gold into the channels of trade and stimulated the neighboring States and Territories to add $500,000,000 more



FIG. 2.—ORE CHAMBER, 30 FEET WIDE AND 175 FEET FROM THE MOUTH OF THE HARD CASH SHAFT.

to that vast sum. By her indirect influence she pushed Japan and China into the current of general commerce, brought them within reach of telegraphs and ocean steamers and thus enlarged the world which she enriched.

"When our Union was in imminent danger, when vast armies occupying an area large enough for a great nation were arrayed against the Stars and Stripes, when the welfare of America was so greatly imperiled that many brave and wise men feared and even believed that disunion was inevitable—in that awful crisis the gold of California came to the rescue and helped greatly to save our country from the fearful evils that would have inevitably accompanied final disruption.

"Besides widening the area and increasing the spread of culture, California has made many valuable contributions to original thought. She has made her territory one of the pleasure grounds of the world. She has done much to give character to the wonderful age in which we live.

"These glorious achievements, these great contributions to culture, these remarkable events which our city has witnessed, to which she owes her birth and in many of which she played a large part—these results of Marshall's gold discovery deserve to be commemorated in a magnificent festival at the completion of the first half century, the only opportunity of the kind for this generation; and therefore we invite you to aid us in a worthy celebration of the Golden Jubilee of California on January 24, 1898.

"Nor should we close our eyes to the material advantages that must accrue to our citizens from the presence of large numbers of people who will not only expend considerable money in our midst, but who will thus be afforded an opportunity to learn of the advantages of San Francisco as a trading and outfitting point. These benefits are by no means small, and their value will be largely increased by the success of our jubilee celebration, which, in turn, must depend for its success upon the liberality and public spirit of our citizens."



FIG. 1.—EXTERIOR VIEW OF THE HARD CASH MINE.

A Kern Co., Cal., Mine.

In '97 the southern part of this State assumed increased mining prominence. For some years the largest number of stamps under one roof in the State have been operating in San Diego Co.; in San Bernardino Co. the dullness in silver production is being gradually overcome by increased activity in gold production, and in Kern Co. the comparatively new Randsburg district is attracting deserved attention. Three miles southwest of Randsburg is the Hard Cash mine, an exterior view of which is given in Fig. 1. Considerable work has developed a large quantity of free milling $12 ore. Fig. 2 shows an ore chamber 30 feet wide 175 feet from the mouth of the shaft. At present the milling is done at Garlock, Kane Springs, Cuddeback Lake and Johannesburg. It costs $10 per ton to mill and cyanide the ore. The company naturally proposes to build a mill of its own. Fig. 3 gives a view of the double compartment shaft.

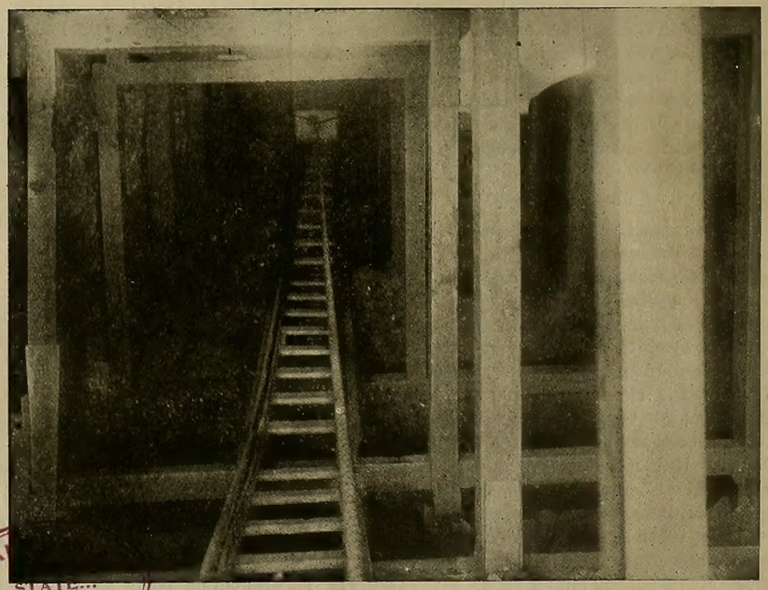


FIG. 3.—VIEW OF THE DOUBLE COMPARTMENT SHAFT OF THE HARD CASH.

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J. F. HALLORAN.....General Manager

San Francisco, January 1, 1898.

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THE Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS will be issued January 29th, the date of the opening of the Golden Jubilee Mining Fair in San Francisco. An unusual number of copies will be printed. Matter intended for appearance therein should be in this office by the 15th inst.

BEGINNING to-day, the Western Union quotation on the price of lead in New York City will be withdrawn, and hereafter "the Gold and Stock Telegraph Co." of that city will furnish daily current quotations for $20 per month to those who do not care to wait for the same thing in the Associated Press report for the following day. So far as the system itself is concerned, there seems little if any difference from former methods.

"A COMPLETE CATALOGUE of papers published in the United States printing over a thousand copies" December, '97, is received from the leading advertising authority in the country. It is of some interest to note that the MINING AND SCIENTIFIC PRESS and three others are the only four mining papers mentioned therein, though there may be others who deserve to so appear. Of the three others one is published in Pennsylvania, one in New York and one in Colorado.

REGARDING the Government relief expedition to the Klondike, Explorer Nansen agrees with the views hitherto expressed herein, that it is useless for the Government to buy 500 or any other number of reindeer in Norway for transportation purposes, by reason of the absence in the Yukon region of the kind of food upon which they alone can live. Explorer Nansen agrees with everybody else who has had any practical experience on the subject in condemning such means of securing transportation. The hardy horse of the North Pacific region is best adapted for the purpose intended.

REPORTS most encouraging to the stockholders come from the Merced Gold Mining Company's property at Coulterville, Mariposa county, Cal. This week it is reported that the average from the amalgam was between $8.50 and $9 per ounce Troy, which, at even the smaller figure, would have made their clean-up for the past month approximate $71,000 from forty stamps. As their payroll did not quite reach $10,000, if the reports are correct, they must have had net earnings of something like $55,000. If this can be kept up it would indicate little need of borrowing $60,000, as reported from Boston, or, indeed, any other sum, so that it would seem that there is very little likelihood of any actual need of assessments or other manner of securing money outside of the mine's yield.

Should Not Pass.

Congressman Ferguson of New Mexico has introduced a bill which is now before Congress for consideration, and which, while ostensibly of benefit to the miner, would, it is believed, be prejudicial to the best interests of the Territories of New Mexico and Arizona, which region it most seriously affects. The first section of the bill provides:

"That hereafter all mines or deposits of gold, silver, quicksilver or minerals of the same, copper, lead, tin, antimony, zinc, bismuth and other valuable mineral deposits, situated within the boundaries of any land the title to which is derived from the Government of Spain or of Mexico, by grant thereof made prior to the conclusion of the treaties between the United States and the Republic of Mexico, on February 2, 1848, and December 30, 1853, respectively, and now embraced within the Territories of New Mexico or Arizona, or within the States of Utah, Nevada, Colorado or Wyoming, are hereby declared to be free and open to exploration and purchase, and the lands on which they are found to occupation and purchase, by citizens of the United States and those who have declared their intention to become such under the mining laws of the United States and the provisions of this act."

No reservations are made regarding land grants previously confirmed by act of Congress, there being over fifty in New Mexico held under United States patent. The confiscation of private interests, the unsettling of titles and the general local disorder that would ensue were such a bill as the above passed are manifest. The bill authorizes any one to go upon any of the lands specified, and explore thereon for gold, silver, copper, lead and other mineral deposits; and the only redress any one holding possession of such land under United States patent would have would be in civil action for damage done.

The bill further provides in Section 3 that the explorer or prospector, after selecting his claim on such land, shall merely post notice of location and proffer $2.50 an acre to the owner of the land, and, if declined, the "explorer" may go on and condemn the land as though it were for railroad purposes and take possession. This is even better than the United States statute, which provides that, before application for patent can be granted, it must be shown that $500 worth of work has been done on the property; then the fees in such cases usually amount to $200 or more, and $5 an acre must be paid for the claim. Under Mr. Ferguson's proposed legislation, $50 would be all the money required to consummate what usually costs twenty times that amount.

The bill is a good or bad example of hasty and incomplete legislation; and while the spirit and purport of the bill are worthy of endorsement, its provisions as at present before Congress would work direct injury and wrong in the region affected.

THE world's production of gold in 1896, according to advance sheets of the forthcoming report of the Director of the Mint, was 9,817,991 ounces fine, valued at $203,000,000, compared with 9,611,377 ounces fine, valued at $199,304,000 in 1895. This increase of the world's gold output in 1896 over that of 1895 is not as great as was that of 1895 over that of 1894, which amounted to $18,129,000; nor is it as great as the increase of any recent year over the preceding one. World's output of silver in 1896 was approximately 165,100,887 ounces of commercial value of $111,278,000, and coining value $213,463,700, a decrease as compared with 1895 of 2,187,842 ounces, commercial value $1,474,606, and coining value $2,828,725. The total world's production of gold from 1493 to 1871—that is, from the discovery of America to the year in which Germany took the first steps toward the demonetization of its silver—was 278,360,543 ounces fine, of the value of $5,754,-223,105.

MR. EDWARD ATKINSON, who can do what he likes with figures, sends us a third edition of a pamphlet in which he endeavors to prove that silver costs nothing to produce at the Anaconda, Montana, mines. This is even better than the chimerical claims of the gentlemen who can produce gold from iron filings, and silver from coal waste heaps. Such production costs at least something, but Mr. A. gravely announces that in the locality named "silver costs nothing." Probably had that distinguished statistician taken the trouble to get some reliable information on the subject before writing about it, he would have arrived at a very different conclusion.

Justly Censured.

A River Convention was held in Sacramento, Cal., last week, wherein the State Auditing Board was justly condemned for its continued action in ignorance or defiance of the act of the last Legislature appropriating $300,000 for the purchase of a dredger, which distinctly stated the purpose of the appropriation. It has been clearly pointed out in these columns before, that the State Auditing Board had no discretion in the matter, beyond carrying out the provisions of the law, and that it was presumptuous and impertinent for these servants of the State to set up their own judgment, assuming a better plan, and spending the money in accordance with their own private ideas.

The temper of the convention was excellent. It was plainly pointed out to the State Auditing Board that they were practically guilty of malfeasance of office, and that, without right or reason, they had presumed to put their personal opinions in the matter before the plain mandate of the State law. The author of the bill, W. M. Cutter of Yuba, recited the facts, which are patent to everyone, and very justly said: "The bill would not have passed had it not been for its exact wording relative to the building of the dredger; and the Auditing Board, created by the same bill, had no right to set up its own judgment in opposition to the express provisions of the law that created it." With unusual impudence the members of the Board saw fit to criticise the press for commenting on their unwarranted action. They at least had the courage of their convictions, and did not seek to throw the blame upon anybody else, shouldering the responsibility for evasion and avoidance. In response, W. T. Phipps, manager of the Anti-Debris Association, very justly said, "that their argument was like that of a farmer with a good farm who refused to buy a team of horses with which to work it, because he had not money enough to buy feed to feed them for fifty years while he was farming."

A vote of censure was, after some excuse and apology, referred to the Committee on Resolutions by a vote of 30 to 23, who, upon readjournment, substituted a mild reproof, stating that in the sense of the convention, it was the duty of the Auditing Board to comply with the law. This substitute was adopted by a vote of 21 to 20; so that, virtually, on two distinct votes, the Auditing Board and the State officers connected therewith, were justly and severely censured.

It is a matter of regret that in this important question, affecting State and national interests alike, recalcitrant officials can be found willing and apparently anxious to fritter away the appropriation made for a specific purpose, in the manner they are doing, without check.

"THE Great Northern Industrial Gold Co., Ltd.," is the latest mining proposition profferred British investors. The property is in Shasta County, Cal., and the scheme is advertised at considerable length in London mining journals. The concern is capitalized at $2,000,-000, shares are $5 each; 50,000 shares are held in reserve by the company. The prospectus is a very pleasant one. As to accessibility, "a stage road passed within ten miles of the property," and "labor of the best kind—good, strong, ready, mountain men—is cheap and abundant." Eminent London mining engineers see 10,000,000 tons of ore in sight, but a local mining engineer of Oroville calculates the "available supply of ore" to be 11,000,000 tons, and, in addition, he "feels perfectly assured there is more than twice that quantity." Another mining engineer considerately declines to make an estimate of the quantity of available ore "because the figures could be made so large that they could scarcely be conceived." In such cases a few million tons of ore one way or the other are of little consequence. This ore is of an average value of $8 per ton, and "$1.35 per ton will cover all expenses when in full operation." It is estimated that $350,000, cash, will be "required

to put the property in full operation," there being sufficient water "power to operate 250 stamps day and night." At the end of fifty or one hundred years, (according to the prospectus) "the question of sinking or following the ore down into the earth, as in ordinary mining, may be considered." One gentleman has succeeded in getting the local owners together and spent "a large amount of time and money," for which he is to be paid "through the vendor." The same gentleman also kindly agrees, as per prospectus, "to go out again and overlook the work on the spot until the mines are in full operation." Certainly nothing could be fairer than that. The London papers give editorial information gleaned from the prospectus, but, of course, wholly uninfluenced thereby. "The precise situation of the property is in Sierra Nevada mountains," is among the exact data thus editorially vouchsafed. The whole thing is interesting, taken in connection with the series of articles and communications on this subject of British investment in California mines which has recently appeared in these columns.

Applications for Patents.

Some recent amendments of the United States patent laws which go into effect to-day attract deserved attention. Hitherto there has been but one barrier to the issue of a patent by our Government to a man who had proved that he was the original inventor. If the article in question had been in public use, or on sale for two years or more before the man sent his application to the Patent Office, he could not receive a patent. The public use and sale would naturally be considered as evidence of his having abandoned all claim to exclusive rights. The natural interpretation of the facts would be that the man did not consider himself the rightful owner, or else was willing to give the public the benefit of his ideas without charge.

The new law provides that if a notice of an invention appears in print, and specifies who is the author of it, the application for a patent must be made inside of two years; otherwise it is assumed that he abandons all claims. This appears just. It sometimes happens that several simultaneously invent the same thing. If the first man who thinks of it does not push the matter, either for lack of money or because he lacks the necessary spirit of enterprise, some of the other men should have a chance to go aheadand take out a patent. The wording of the revised statute is as follows:

"Any person who has invented or discovered any new and useful article, machine, manufacture, or composition of matter, or new and useful improvement thereof, not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country for more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application, may, upon the payment of the fees required by law, and other due proceeding had, obtain a patent therefor."

THE horizon of the Mining Fair to be held in this city, beginning January 29th and closing March 6th, constantly enlarges in scope. Several California counties, realizing the value of the advertisement, have made suitable arrangements to be appropriately represented thereat, and it is not yet too late for any mining county in this State to secure space and appropriately use it. The MINING AND SCIENTIFIC PRESS has so frequently pointed out the manifest advantages to be gained from such an exposition, that no urging need be necessary in this regard. The committees in charge of the Golden Jubilee celebration and of the Mining Exposition are doing considerable preparatory work and success is assured. It has been determined by the Mining Bureau of this State to make appropriate exhibition. The exhibit which Nevada sent to the World's Columbian Exposition will also be displayed intact. The entire exhibit of the State Board of Trade will be likewise transferred to the Pavilion. Considerable interest also attaches to the parade and general celebration in San Francisco of the Jubilee week, beginning the 24th inst. Governor Budd will declare the 24th a legal holiday. Members of different organizations will unite in making the parade a notable one. Miners will be interested in knowing that what is probably the most extensive and elaborate scenic effects of practical mining operations ever seen in an exposition of this kind will be at the Mining Fair, and that the latest, up-to-date processes and machinery for gold mining will be in practical operation.

American Dynamite in South Africa.

From Cape Town, South Africa, Consul Roberts writes: "Such an important position does the dynamite trade occupy to-day in that part of Africa south of the Zambesi that peace in the Transvaal, it might be said, depends much on its regulation. The first suggestion mentioned by the mining commission, appointed by the Transvaal Government some time after the Jameson raid to investigate the alleged grievances of the Johannesburg Uitlanders, was to lower the tariff on dynamite. This, the commission believed, would go far to conciliate the influential element on the Rand, mine owners, shareholders and mining engineers. It was the almost prohibitive duty on dynamite that incited many of the better class of Americans, who form a vast majority of the mine managers, engineers and experts at Johannesburg, to take part in the Jameson fiasco. It was due to these men also that American dynamite was introduced into South Africa, until now the United States furnishes more than any other country to this portion of the world. It is satisfactory to note, however, that this steady growth may be ascribed to the superior quality of the American goods, which is attested to by nearly all mining men on the Rand, irrespective of nationality. This is shown from the fact that dynamite can be delivered in the Transvaal from Hamburg, including cost of importation and duty, at 37s 7d ($9.39) per case, and from Dr. Nahnsen's factory for 46s 1d ($10.87), while the rate from America is 47s 7d ($11.22), but the latter country, nevertheless, has the call on the trade. The cost from Cornwall is 52s 1d ($12.33) per case. The quantity of dynamite and other nitroglycerine compounds landed at Cape Town from abroad in the year ended December 31, 1896, was 55,000 pounds, valued at £791, or $3,955. Dynamite and blasting compound powder (practically all the former) was imported into the colony during the same period to the amount of 12,327,540 pounds, valued at £538,245 ($2,619,225). Of this amount 1,301,210 pounds were entered for consumption under the union customs act prevailing in Cape Colony, Orange Free State, Basutoland and the Bechuanaland protectorate, while 10,940,013 pounds were for transportation to the South African Republic and Rhodesia, an insignificant portion being shipped to the latter province.

"The duty on blasting compounds for consumption in the countries included in the customs union is 3d (6 cents) per pound. On that entered for transportation to non-union countries a transit duty of one-half of 1d (1 cent) per pound is levied.

"Immediately on the discovery of gold in the Transvaal, dynamite came into great demand, and a syndicate, seeing the opportunity for immense profits, obtained a concession from the Government to manufacture the explosive. This developed later on into a monopoly, for, when the mine managers objected to the Transvaal article, which was manufactured from ingredients procured in Germany, the duty on the imported article was raised to what was expected would prove a prohibitive rate. The top rate reached was 9d (18 cents) per pound. Figuring on the rate per pound as 1s 9d (42 cents), and including the transit duty and other details of shipment not counted in the computed total, the cost of the article delivered at Johannesburg is just double the wholesale cost at Cape Town.

"Many mines preferred to pay the exorbitant rate and get the American article, but there was enough demand for that manufactured in the Transvaal to cause a great rush, and when the syndicate found they could not put the imported ingredients together fast enough the manufactured article was imported straight from Germany and entered, of course, free of duty."

THE December drouth and continued frost has seriously interfered with mining progress throughout California. The water courses are running very light, and, so far, the usual supply of snow and rain is entirely wanting.

To Prevent Mine Accidents.

Mine Inspector Byrne of Montana makes report in which he says: "Unlike most other callings, the security of the miner is largely dependent upon the care and prudence of his fellows, but so wide is the character and disposition of men that in order to obtain unity of action from large numbers, the necessity of subordinating individual plans and methods to a well organized general system must be evident. The duty of the superintendent does not cease when he furnishes means of safety and issues instructions. He should see that the one is properly used and the other implicitly obeyed, and in no instance should he allow the subordinate officials to jeopardize the safety of those in his charge.

"Opposition has been manifested to the law requiring the enclosure of safety cages in vertical shafts. The purpose of the law is to protect the miner against the various dangers encountered while being lowered in or hoisted out of the mine. The necessity of it is shown by the number of lives sacrificed while riding in open cages in the past. With a few exceptions, the law had been complied with. Conditions existed in those exceptions which made it nearly impossible to comply with it within the time specified. A degree of indulgence has been exercised in this matter in the hope of removing certain prejudices existing among a considerable number of employes as well as a few mine owners; also to allow time in which to complete improvements and changes planned previous to the enactment of the law. I am convinced that reasonable leniency is the better policy as against arbitrary enforcement. Sufficient time has now intervened to demonstrate the feasibility and advantage of the measure by pointing to its successful application elsewhere. Now that these conditions which formerly operated against the immediate enforcement of the law have practically disappeared, proper steps have been taken to secure its rigid observance in the near future."

APART from the shrinkage in speculative values of South African mining enterprises, a review of the dividend record of South African corporations for the past two years shows considerable justification for that region being a favorite one for British investment. The possibility of a reform in the Boer government of the South African Republic, which will remove some of the present excessive taxation from the miners, also renders probable a decreased cost of gold production in '98. For the bluffing tactics that culminated in the Jameson raid has been substituted on the part of the Uitlanders persistent showing how mutual interests could best be served by relief from the present untoward system of monopolies. The earning power of the South African mines is noticeable. Good authority is given for the statement that the dividend-paying mines of the Rand district yielded their shareholders $12,250,000 in dividends in 1897. When it is remembered that in 1895, the year of the biggest "boom," the mines of that district paid in dividends a little over $10,000,000 it will be seen that the gold-producing properties keep up very well. The diamond mine companies of the Transvaal, which in 1896 paid dividends aggregating $9,500,000, in 1897 yielded a total of dividends amounting to nearly $9,000,000; and in the same time copper mining companies of that region paid dividends aggregating nearly $1,000,000. These figures go far to justify the financial interest evinced by British investors in South Africa.

A BILL has been introduced in Congress to appropriate funds for investigations and tests of American timber. The bill starts out with the following preamble: "Whereas, an enormous waste of forest products and incalculable loss of life and property occurs from ignorance of the true value and strength of American timber; and whereas a thorough examination and elaborate tests of our timber have been introduced in the forestry division of the Department of Agriculture, but have proceeded very slowly, and have now been entirely discontinued on account of deficient appropriations, therefore be it enacted, etc., that the sum of $100,000 be hereby appropriated" for the purpose. It is provided in the bill that not less than 30 per cent of the amount appropriated be devoted to the testing of timbers of the Pacific coast.

Notes on Western Australia Mines.

Written by JOS. GRUSS, M. E.

Having returned on the Mariposa on the 18th ult. from Western Australia, it might interest tne readers of the MINING AND SCIENTIFIC PRESS to know something definite about that far-off and interesting mining country. After going from here by way of the Suez canal I landed in Albany, one of the principal ports of the colony. From there to Perth, the capital of the colony, the distance is 275 miles. The latter town is situated on the Swan river, the only flowing stream in the colony, and has a population of about 40,000. It is eleven miles from Freemantle, on the Indian ocean, which is the most important seaport in the colony, and is 2500 miles west of Sydney, New South Wales. Perth is a rather pretty place, quite hot, and has some very fine buildings. The town is built on a white sand, which is the general nature of the country for miles around. It is sadly in need of a good sewerage system, as there are many bad odors prevalent owing to lack of same. It is also the cause of considerable typhoid fever, etc. The flies are also very troublesome in the summer season, which corresponds to our winter.

After leaving Perth the first mining town I struck was Yalgoo, in the Murchison gold fields, about 350 miles southeast of the former place; population, about 150. The country traversed is a perfect plain, with only such a slight rise toward the interior that it is imperceptible. At this place there are quite a number of mining leases (or locations), but the most important ones are the Emerald and Gem. One has a 10 and the other a 5-stamp mill. These mines were very rich from the surface down to a depth of about 45 feet, the rock milling from two to seven ounces per ton, besides what was lost or run off in the tailings. But they did not go down, apparently, as they were looking for the "reef" or vein on the 80 and 100-foot levels, without any indication of finding the same. The vein gave out, as they are only "top mines." The system of mining and milling here was very crude. The stoping was mostly done from the top downward, in place of upward, and the plates used were as hard and dry as a bone.

The next place was Mount Magnet, some sixty miles distant by rail, which is quite a mining camp of the usual West Australian type—corrugated tin houses, tents and Hessians (which latter are burlap houses, and to protect them from the heat of the sun they are covered with bough sheds). Mount Magnet derives its name from a small hill near by, which rises some 100 feet higher than the general average of the country. There are quite a number of mines and some mills here, and also a great many "shows," which is the Australian name for prospect. The well-known Welcome mine is located at this point, the rock of which was of fabulous richness. Over 6000 ounces have been pounded out by hand mortar in a few months. The deepest shaft in West Australia is located here, its depth being 500 feet; but there is nothing in the bottom. Mount Magnet is also quite an important point, from whence depart a great many camel trains for the East Murchison gold fields, over 200 miles distant. The population is about 750.

The next place we visited was Lake Austin, or Austin Island, about thirty miles to the east. It is a dry lake, like all West Australian lakes, but contains water after a series of heavy rains (which are not frequent in this section), when it soon turns into brine or salt water. Here are two mills and quite a lot of mines and prospects, or "shows." Neither of the mills was running at the time for want of sufficient water, and also a scarcity of good ore, as the best was worked, it having been near the surface. But while it lasted it was exceedingly rich, going up to fourteen ounces per ton.

From here to the next mining camp, which is called Day Dawn, it is about twenty miles (to be made by stage), and in that space there are numerous mines and prospects, and several mills, which are, as a rule, short of water. The ore is irregular and patchy, but very rich. Like all mines seen so far, they do not go down very deep; from 60 to 100 feet is about the most auriferous zone. Most of the mills and hoisting works in this part are not housed in, everything being exposed to the sun. At Day Dawn there are several mines, but the most important one is the Big Day Dawn, which has forty stamps, and was not running at the time of my visit. It is one of the worst butchered up and most senseless mining and milling plants I ever saw. Everything is built wrong end first. It could have been remedied by the investment of a few hundred dollars in cement, to raise the mill and battery and make things work automatically or by gravitation. The quicksilver from the plates was running in great globules down the sluices, and the loss of amalgam and gold must have been great. The vein is a large one, some 18 feet wide, and the ore shoot is reported to be 300 feet long, but low grade—not over fourteen pennyweights to the ton. Mr. L. P. Goldstein, formerly a field deputy in the Mining Bureau in this city, has been appointed manager since I saw it. The heat in the summer time is very great at the above place.

Four miles east we come to Cue, one of the oldest and largest mining camps in the Murchison gold fields. It had a population of about 2000 at the time of my visit, but has grown considerably smaller since I left. It has four banks and four or five hotels, in each of which there are no less than two bar rooms presided over by the ever-present bar maid. The postoffice and the Murchison Club Hotel are the best buildings, being of stone and brick. The Government owns the water works, which consist of a well with a steam hoist. The price of water is reasonable, 12 cents per 100 gallons. The rate of wages for miners is about 12 shillings ($3) per day. Almost everything consumed in the shape of eatables is canned. No attention is paid to the table of the hotel, but the bar is the point of attraction. Drinking is excessive here, and the flies are a great torment. Within a radius of five miles of the place are a great many mines and "shows" and some twelve mills, which were mostly idle, either for want of sufficient water or lack of pay rock, as the reefs here do not go down deep, either. The deepest shaft was 200 feet. A great deal of money has been squandered and wasted unnecessarily, three men being generally employed to do the work of one good man. An immense amount of dry blowing has been done in and about this place. Hundreds of acres have been turned over three or four times, with very good results for the first time or two, but there was only small wages in it while I was there. Eight hours constitute a day's work, and Saturdays four hours.

Some seventy or eighty miles from here is the mining camp of Peak Hill, whose ores are very rich indeed, going as high as twenty-four ounces per ton, and it has been and is yet a fine place to make money for prospectors by the hand mortar process, some of the small seams being worth at the rate of 100 ounces per ton. But they do not go down any great distance.

The next place is Lawlers, 210 miles east of here, in the East Murchison mining district, and is divided from the Murchison district by the Black range, being a small range of hills of ironstone and quartz. The intervening country is a perfect plain, mostly covered with the usual West Australian mulga, sandalwood and other small trees from 8 to 20 feet high and 3 to 8 inches in diameter. The road for the greater part is good, with some sandy spots here and there. This distance must be made either with horse teams or by camels. The Government has sunk wells every thirty or forty miles to facilitate travel, so you can stop at a well about every night. There are no habitations on the road to speak of. Lawlers contains a population of about 380, including a few families. At this place is located the property of the Great Eastern United, Limited, which has twenty stamps running. The ore, which is a pure quartz, has been averaging two ounces per ton. The depth from which the rock was hoisted is only 72 feet. The vein or reef runs from 2 to 20 feet wide and the ore shoot is 1200 feet long. On the 130-foot level, the deepest point, nothing has yet been struck of practical value. No dividends have yet been declared. The expense of extracting and reducing the ore is quite large, some 120 men being employed to keep the mill running, together with numerous officials and sinecures, who only render technical service. They have a sufficient amount of water for milling, which comes from the mine and is fresh. The process is the amalgamation in the battery, on plates and some blankets. No concentrators are used. Like all West Australian mines, there are too many men and superfluous officials. There are a great many mines and shows located in and about here, but none have any crushing plant except the Great Eastern United, Limited.

From here my route was to the north forty miles, where is located Mount Sir Samuel, where the Bellevue mine is found, which is the only good and great mine here so far found. Its depth is 80 feet, and the level from which the ore is taken is 52 feet. The vein will average 8 feet in width and the ore body is about 1600 feet in length, and should easily mill two and one-half ounces per ton without any trouble. The ore is somewhat copper stained and contains, also, much oxide of iron and the well-known ironstone of West Australia. The country rock is diorite in the bottom. They have a 20-stamp mill on this property, but up to the time of my departure it was not running, owing to insufficiency of water. On the foot wall side the water came in fresh, and on the hanging wall it was salt. Lake Corrigan is near by, but, like all West Australian lakes, is dry. The next mine to the north of the Bellevue is the Mertzy's Reward, of which Mr. H. Stansfield, a Tuolumne Co. man, is manager. It is a small concern, with rich rock, but not sufficient to justify the erection of a mill. The depth is 60 feet. The Venture Syndicate, a London corporation, worked a lot of leases here also, but gave them up, the ores being fairly good but limited in quantity.

Twelve miles north of Mount Sir Samuel is Mount Pascoe, where the Abbott lease is located, being the property prospected by the Great Fingall Reefs Co., Limited, of London, of which I was the manager. It is developed by four shafts. The vein stands almost vertical and is encased in the usual matter, called "mullock" in West Australia, which is something of the soft metamorphic schistose order, being the general formation in which veins are found in this part of the country. It extends down from 60 to 100 feet, where it usually encounters the hard, close-grained diorite, and the veins, as a rule, cut out or terminate on that formation. This reef was quite rich on and near the surface, being worth over two and one-half ounces per ton on the surface; but in a measure as it went down it became poorer and smaller, until it terminated on the hard diorite, where it gave out altogether. Therefore, it did not justify the erection of a mill, owing to the limited quantity of good ore in sight and the great expense to be incurred in erecting and running a mill and operating the mine. Labor is $3.33 per day and timber is quite high. Water was brought on camels twice a week. There are other shows or prospects in the vicinity, the most promising one being called the Nil Desperandum, which has about 3000 tons of ore in sight. It is claimed to be two-ounce rock, but the manager, for some reason, objected to my sampling it.

Lake Darlot and Lake Way are also in this neighborhood, and each one contains numerous shows or prospects of rich ore in moderate quantities, but have no crushing plants.

To an American mining man the country looks, as a rule, "butchered" by the impractical and expensive methods of so-called eminent mining engineers of English and other colleges and schools, who have a lot of initials after their names, which is their only stock in trade. And the result has been that millions of pounds sterling have been wasted and every ounce gotten out has cost John Bull six to get.

The English mining promoter, middleman and mining shark is not quite as scrupulous as his American cousin, so you can imagine the kind of a man he is.

It is quite unsatisfactory and disappointing to most Americans to manage shows or prospects, in so far that a report has always been made in advance by those so-called eminent engineers, who put up the grade of the ore to two ounces or over (generally two ounces), irrespective of its real milling value, and if it does not contain one-half of an ounce the American is expected to substantiate or affirm the amount it is "sladed at" by the "eminent fellow," and if he does not, the *entente cordiale* with the consulting engineers and promoters will be much disturbed, as they always retain the position of consulting engineer.

From a mining point of view West Australia is an interesting country, but it will never be a place of homes for miners or prospectors until the promoters step out and the prospectors rely on themselves to get the metal out of the ore, and not wait to sell out. As it is, the prospector or miner, if he has no chance to sell his show, folds up his tent and walks off with his house on his back to look for something elsewhere.

The Government is doing all it can to open up the country by railroads and sinking wells, to cheapen and facilitate travel. But most all prospecting camps are reached by camel trains. Feed is quite high for horses, whereas camels are par excellence the animal for level and dry plains. Where a horse will starve without being fed a camel will do well, as he can stand it without water for a number of days; and if he is forced to do so he will go twenty or twenty-four days without water, and his food is the small branches of the mulga and sandalwood and other trees which cover the country. A camel will carry 600 pounds and upwards thirty-five miles a day, and a good riding camel will go 80 to 110 miles per day.

In another letter I will give a description of the country between Lawlers, Coolgardie and Kalgoorlie, covering a space of 370 miles, traversed by me.

There are a few Californians down in that country, best known of whom is C. H. Kaufman, formerly a well-known surveyor here; also H. C. Callahan, H. Stansfield, W. A. Irwin and a young man by the name of Hoover, a miner from the Leland Stanford University. It is reported that Charley Kaufman is a millionaire now.

THE A. & P. ROBERTS COMPANY, which owns and operates the Pencoyd Iron Works of Philadelphia, has received a cablegram from Utrecht stating that the company's bid of $474,000 is the lowest in competition for the contract for the material and erection of an extensive iron bridge over the river Yssel, near Westervoort, Netherlands. The bridge is to be built for the government of Holland, and the Pencoyd Company had as competitors a number of the leading iron manufacturers and bridge builders of England and Belgium.

THE displacement of a ship is the volume of that portion of the hull which is immersed, or which has displaced an equal volume of water and now occupies its place. Displacement is properly expressed in cubic feet, giving the measure of the place or hole-in-the-water filled by the ship. As the weight of the vessel as she swims is exactly the weight of the water displaced, it is convenient to express the displacement as so many tons, meaning tons of water at 35 cubic feet to the ton.

Hydraulic Mining.*

NUMBER III.

Dams and Reservoirs.—For arresting and diverting the water of the supplying stream into the ditch, a dam of some kind will be required. As the mountain rivers and streams of California are torrential and subject to violent floods, these structures need to be solidly built. They are usually of two kinds, one being constructed of round or hewn logs so placed across each other as to form a series of cribs from 8 to 10 feet square, these logs being notched so as to lock into each other and fastened together with wooden pins, or, better, with iron bolts, the bottom timbers being bolted to the bedrock.

As the dam is built up these cribs are filled with rock. To render it tight the face of the dam is planked, the seams between the planks being battened or calked. A cheaper and more common style dam is made by felling large trees across the stream and then placing the butts of other and smaller trees on these with tops up stream. This done, another layer of trees is placed at right angles to the last, this process being continued until the structure is raised to the proper height. Each layer of trees as put down is covered with rock, gravel and brush, forming a mass not easily effected by the greatest floods.

Hardly ever are dams of masonry or framed timbers built for filling these ditches, as these other and cheaper structures generally answer every purpose. Sometimes nothing more than large bowlders are thrown into the stream, thus serving to divert enough water to fill the miner's ditch.

For regulating the admission of water into the ditch a gate must be placed at its head, the drop in the gate being raised and lowered by means of a lever or screw. Where practicable, it is well to have the upper part of the ditch, for a few yards at least, cut in solid rock, as affording greater security to the gate and the ditch itself against floods.

Owing to the recurrence of the long, dry summers in California, and the consequent low stage of water in the larger streams, some of which fail altogether, the storage of enough water to enable the hydraulic miner to continue or much prolong his operations during this, the most favorable season for the same, becomes to him a matter of paramount importance; hence the construction of the many large reservoirs found in the mountains of California, formerly drawn upon to supply the hydraulic ditches when the running streams failed.

Hardly anywhere else in the world can be found such costly and capacious reservoirs as these in the region above indicated, although similar structures, designed to fill the irrigating ditches, are now being built in other parts of the State, some of which, as regards cost and holding capacity, rival the great water repositories cradled in the basins high on the westerly slopes of the Sierra Nevadas.

These stupendous works were projected and built at a time when the hydraulic miners had reason to believe that they would be permitted to carry on their operations without interruption—at a time when the people and the public authorities of this State were applauding the enterprise of the builders and encouraging them to make these heavy expenditures.

Bedrock Tunnels.—The bedrock tunnel, so called, is an adit driven to reach and open up the gold-bearing gravel deposit where this rests in a channel having rocky sides, the latter termed often the "rim-rock," it consisting of the same formation as the bedrock—the floor of the channel. Not in all hydraulic deposits, nor perhaps in a majority of them the world over, does the bedrock tunnel become a necessity. In California these adits are not much needed except along the central portions of the main gold belts, the sites of the dead rivers or ancient pliocene channels. Elsewhere in the State these deposits occupy, for the most part, the channels of more recent streams, being the former beds of the present rivers, which, on becoming filled up, were deflected from their course. Owing to the frequent shiftings, or other causes, nowhere have these streams eroded the deep, rocky troughs characteristic of the dead rivers. The extreme richness of the latter, many portions of which contain enough gold to warrant their being exploited by the drift method, more than compensates for the additional cost necessitated by the driving of these tunnels.

Where a tunnel of this kind requires to be run, a shaft should first be put down to bedrock in order to determine the level on which it is to be carried in, otherwise there is danger of its being too high, thereby defeating the end it is designed to subserve. If the tunnel on reaching its objective point is found to be too low, a shaft must be raised connecting its inner extremity with the washing pit. Through this shaft the water and gravel are dropped into the tunnel, and by it transmitted to the sluice set below its mouth, the tunnel itself usually being paved throughout its entire length with cobbles or wooden blocks. Their character as regards size, grade, etc., will naturally suggest itself to the builders, the rule being to adapt the size of the tunnel to the work to be done, and give it all the grade there is to spare. Frequently it happens, even in these pliocene formations, that large bodies of gravel stand above the rim-rock. Where such is the case, washing may be commenced and carried on for a long period, the construction of the bedrock tunnel being meantime delayed.

(To be Continued.)

*Begun in issue of Dec. 18th, '97.

Forged Steel Shoes and Dies.

Herewith is shown a representation of forged steel shoes and dies after having been in use for ninety-three days at the Berners Bay Mining and Milling Company of Alaska on extremely hard rock.



AFTER NINETY-THREE DAYS' HARD USAGE.

It is thought that in some localities these shoes and dies would have lasted thirty days longer. They were furnished by the Union Iron Works of San Francisco. These shoes and dies are forged from tool steel and have given general satisfaction. Exact data is not at hand regarding the service, but it is believed that the shoes and dies as shown crushed at least three hundred tons of unusually hard rock.

Notes on Present Western Practice of Metallurgy Economically Considered.

NUMBER III.

By W. B. DEVEREUX.*

With coppery ores I have used a forehearth to collect both the matte, slag and lead, and found it to work satisfactorily, except for the disadvantages of cooling too rapidly, to which I have called your attention, and even then it worked more satisfactorily than the old method of separating the lead inside the furnaces. If lead furnaces could be constructed to run satisfactorily with a capacity of 200 tons a day, I have no doubt that the forehearth could make a very complete separation of clean matte and clean slags, and, at the same time, make more campaigns. I have recently seen in a lead furnace a forehearth after the Orford plan, being used, which, as you know, is a rectangular box divided by a brick partition, with an opening between the two compartments at the bottom of the partition. The matte and slag flow into one compartment and separates by gravity, and the matte rises in the other compartment and overflows from a spout about 2 inches lower than the slag spout, the slag flowing out from the spout in the first compartment. This was, however, supplemented by the addition of another pot to catch any small grains of matte carried over in the current of flowing. The best method of disposing of slag is by granulation in a current of water, which carries off the slag and deposits it at some point below the smelter. Where water is available, this is very much the best method in use, and brings about a great saving in labor and cost. The slag is simply allowed to overflow from the forehearth into a trough with a rapid flowing stream of water, and is immediately granulated and carried away to any convenient point. Where water is not available, the present practice in large works is to use the Nesmith slag trucks. As you know, they consist of two large pots on a truck, so arranged that they can be swung out to the side and dumped on the outside of the track. The track for this is placed along the edge of the slag dump, and is moved out as the dump extends. In some works the slag is tapped or poured from the pan pots into these slag trucks. In others it is poured into very large pots, from which the slag is tapped from the side, and the matte tapped subsequently from the bottom. In others, the slag empties directly from the forehearth into the bowl of the truck. The ideal method for separation would be to have the slag flow from the forehearth into the water, or directly into large trucks, the matte being either tapped from the forehearth or allowed to overflow. In Rhodes' method the slag and matte from several furnaces are poured into a reverberatory furnace, which is in effect a heated furnace.

It is found that, even with the syphon tap for lead, a certain amount of lead often finds its way out from the slag tap into the forehearth, and this is obtained either with the matte or by tapping the forehearth at its lowest point. Of course, the most valuable product of the furnace is the bullion, so called, consisting of lead, varying amounts of silver, gold, and some copper, if copper is present in the ore. It is obtained by means of the well known syphon tap, generally by dipping from the bowl, but in some works by means of a trough which swings over molds arranged on the circumference of a circle of which the trough is the radius. With this arrangement a number of molds can be filled at a time. Copper in lead ores in any considerable quantity often causes a great deal of trouble with the lead in the crucible, as it has a tendency to separate out in the form of a copper-lead alloy, which gradually cools and fills up the crucible, making it necessary to blow out the furnace and chisel out the crucible. As this alloy is very tough, it makes the process very expensive. For this reason smelters do not like to have their lead mattes run over 10 per cent copper.

The principal part of the copper should go into the matte, which is a mixture chiefly of sulphides of lead, copper and iron. If this carries little copper, it is simply crushed, roasted and put back into the furnace, furnishing iron for flux, giving up its valuable metals to the bullion.

In lead bullion carrying copper the copper is only paid for at the price of lead, and, as it is worth three or four times as much, it is desirable to save it by itself. The present practice is to save the lead-copper mattes until a sufficient quantity has accumulated; roast them with sufficient heat near the discharging door of the furnace to make them slightly sticky, in which condition they are turned out of the furnace and allowed to cool. This agglomeration is simply to prevent them from being blown out of the furnace as dust.

The roasted matte is smelted in a furnace with a shallow crucible, and with sufficient quartzose ores to flux the iron. If the proper mixture is made, the lead will separate as bullion; the copper will combine with the sulphur left in the roasted matte, making a matte of from 45 to 70 per cent copper, the iron combining with the silica and making a fusible slag. Twelve years ago I had to face the problem of the disposal of a very considerable quantity of these mattes, carrying a large amount of silver, where shipment was impossible. I was able, by running a basic iron slag, to make a very rich copper matte, and to obtain a lead bullion carrying not over 5 per cent of copper. The last product of the furnace, and one which is very annoying, is the smoke and dust which pass out with the products of combustion.

(To be Continued.)

* Condensed from School of Mines Quarterly.

A Fine Map.

A comprehensive map of the vicinity of Grass Valley and Nevada City, Cal., has been published by Chas. E. Uren, C. E., of Grass Valley, Cal. Mr. Uren has had considerable experience as a civil engineer and mineral surveyor, and is well qualified to give mining men a correct and consequently reliable map of the section above named. The work has been compiled from U. S. Government Surveys and personal observations in the field. The mechanical part of the map is also well executed. The price is $5.

AMERICANS generally credit John Bull with "cute" expedients in accounting for his defeat as a runner of locomotive steam engines. On several of our American railroads the speed recently attained by American-built locomotives surpassed anything of the kind attained on English rails. To account for this our cousins over the water have made a brand new discovery, to-wit: that the American mile is 5000 feet instead of 5280! The same discovery is not yet known in the United States, but several English publications have announced it, and they are using this supposititious discovery "to discount some of our locomotive performances."

Electrical Progress.

Electric Storage Battery Road.

Chicago's new storage battery road is successfully operating twenty motor cars regularly. This road is the first one in this country to have an equipment specially designed throughout for the use of this system of electric traction.

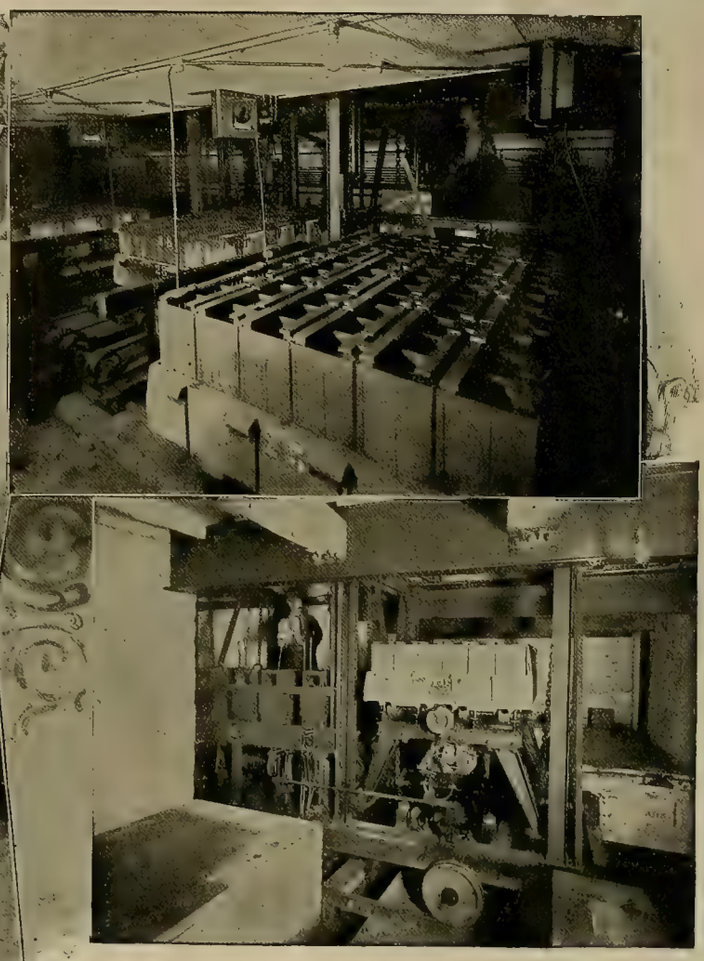
The basement under the car barn is the most interesting part of the entire plant. Here the storage batteries are charged. Several views of this part of the plant are presented herewith. A cross-section of half of this basement shows the batteries arranged on both sides of a central alley, extending the length of the building. The center of the car in the barn comes directly over this alley.

The method of handling the battery trays presents a unique feature. The problem was to remove the discharged batteries at the end of each trip and replace them by a charged set with the least possible delay and with the minimum amount of labor, enabling one man to do the entire work. The elevator is part of a traveling carriage which runs along the track in the alley, extending down through the center of the charging room in the basement. This carriage is provided with two elevators—one at each end—while the middle is occupied by a platform for the attendant, from which he controls the operations. Each elevator is fitted with rollers worked by skew-bevel gearing upon which the battery trays are carried. The charging tables on each side of the transfer pit are also fitted with similar rollers and a clutch coupling is arranged so that the rolls on the elevators may be coupled to the rolls on the charging tables and the trays automatically shifted. There are two of these carriages, one in each charging room, though the present equipment requires but one. Each carriage is provided with five motors—one to operate each elevator, one for each set of rolls and one to run the carriage up and down the alley between the charging tables.

The process of replacing a battery tray upon the car is as follows: The car rounds up into the station from either direction, stopping under the arcade exactly over the pit at the end of the charging room. The attendant below raises an elevator and removes the discharged battery, it being released by the pulling of a lever. On lowering the elevator the entire carriage is advanced a few feet, bringing the charged battery directly under the car truck, to which it can be readily making automatically by means of the plates on its side an electrical contact with the charging circuit. The mechanism of this battery transfer carriage is made entirely interlocking, so that it is impossible to perform two operations at the same time, which would probably prove disastrous. Thus it is impossible to move the carriage until the elevator is lowered from under the car, and the trays cannot be rolled in either direction until the charging tables and the carriage tables are directly in line. The elevators can also be used for placing a charged battery in the car while it stands on the car barn tracks, so that each car on leaving the house is ready for the road. The motors on the cars can also be removed with the aid of the elevators, thus facilitating repairs and inspections. The batteries on each car consist of seventy-two cells, each containing nine plates—four positives and five negatives. The negative plates are all of the "Chloride" type, but part of the cars are equipped with the "Tudor" and part with "Manchester"

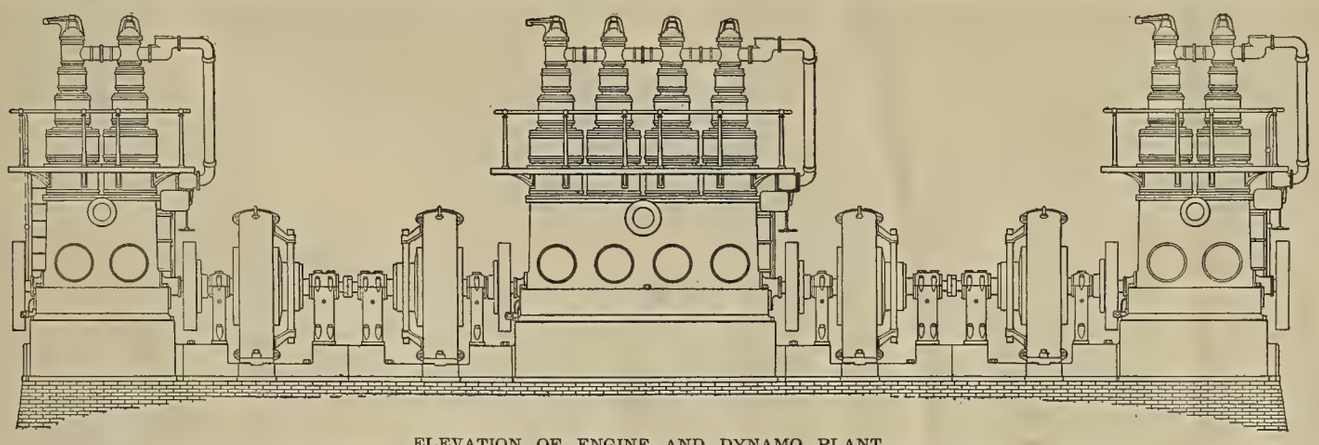


Battery Charging Room, Showing Trays. Transfer Carriage With Battery Tray.

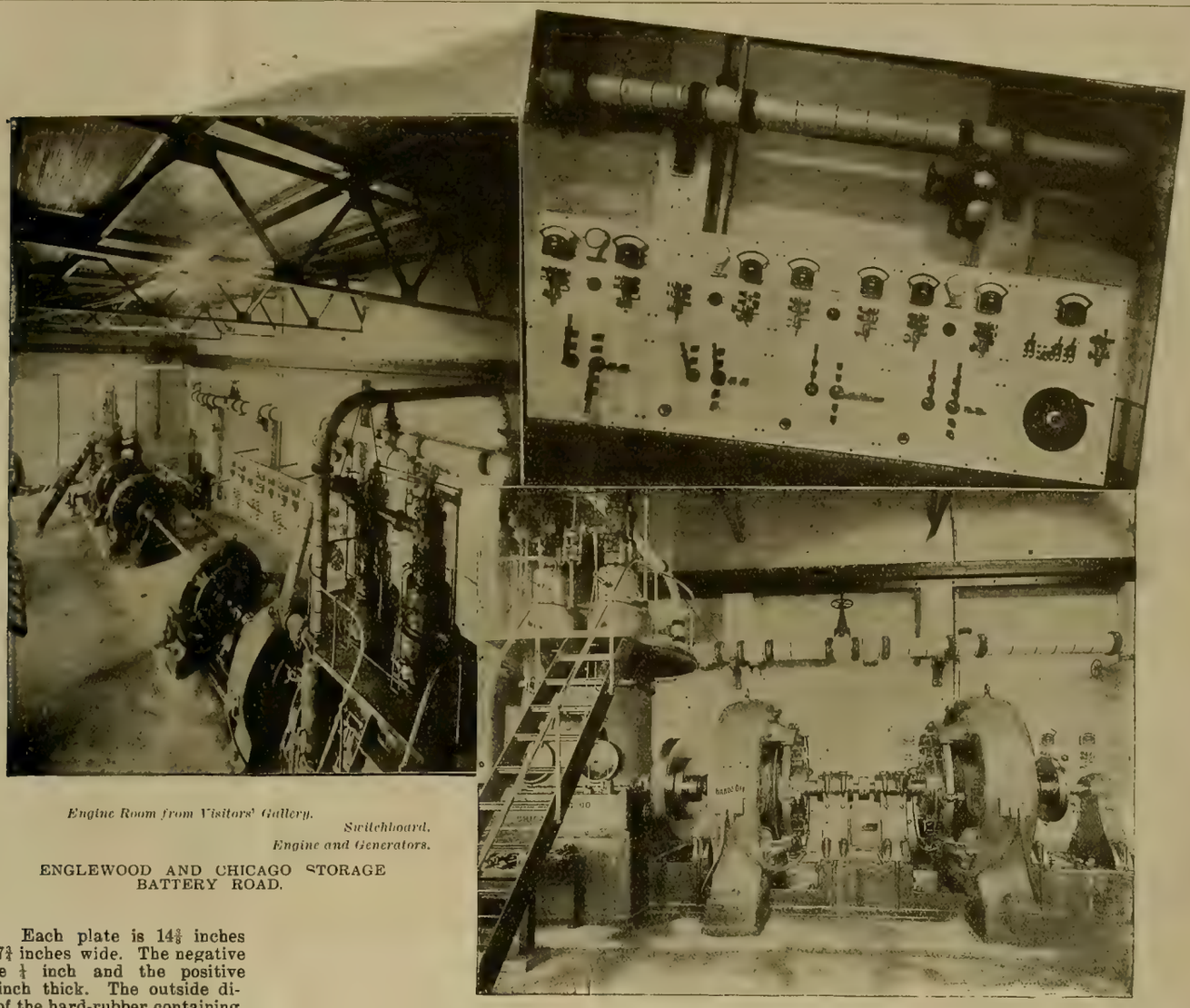


Rolling Battery Tray on Transfer Carriage. Raising Battery Tray Under Car.

ENGLEWOOD AND CHICAGO ELECTRIC STORAGE BATTERY ROAD.



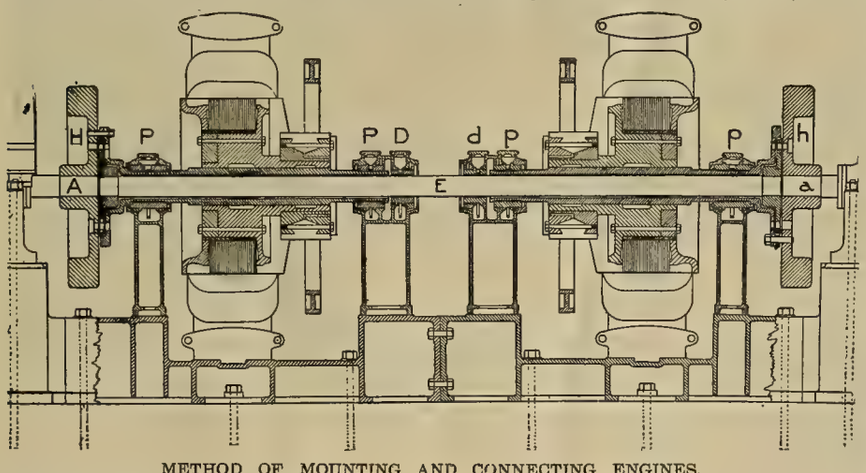
ELEVATION OF ENGINE AND DYNAMO PLANT.



Engine Room from Visitors' Gallery.
Switchboard.
Engine and Generators.

ENGLEWOOD AND CHICAGO STORAGE BATTERY ROAD.

positives. Each plate is 14⅜ inches long and 7¾ inches wide. The negative plates are ¼ inch and the positive plates $\frac{5}{16}$ inch thick. The outside dimensions of the hard-rubber containing jar are 5¼x8½x17¾ inches deep. The weight of the elements of each cell is seventy-five pounds, of the jar five pounds and of the electrolyte twenty pounds, making a total weight for each cell of 100 pounds.

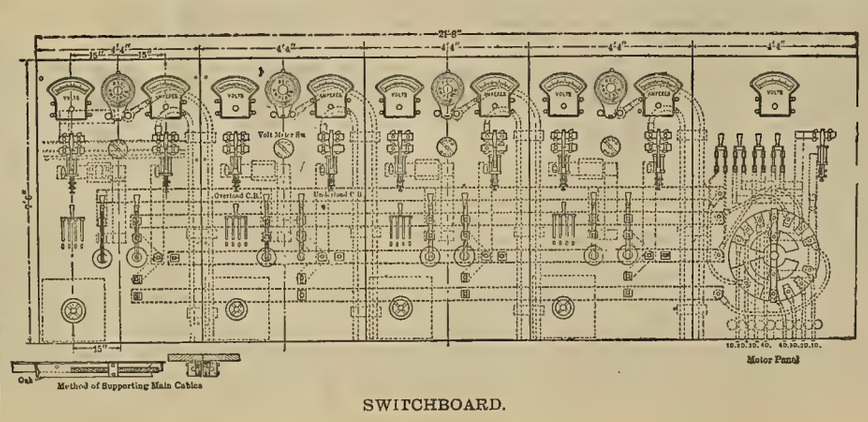


METHOD OF MOUNTING AND CONNECTING ENGINES.

Each tray contains seventy-two cells, arranged in twelve rows of six each. The battery plates are connected by means of lead strips electrically welded, thus making a solid joint. The batteries are arranged in four separate groups of eighteen cells, each group being connected by flexible cables to two large brass plates on the side of the trays. The entire weight of the tray of batteries is 7800 pounds, which makes the extra weight of the car due to the storage cells about four tons. The top of the batteries is covered with a loose-fitting hard rubber crate which prevents the splashing of the acid out of the containing jars. The storage batteries, when in series, will deliver a current of 400 amperes at about 144 volts. Those which have been in service more than six months, and have made over 6000 miles, have yet to show any signs of deterioration. To make the round trip of nearly twenty-four miles takes a car about two hours, which is practically the time each battery is in service. They can be fully charged in forty minutes, but will show a slightly better efficiency if the time of charging is longer. It will thus be seen that it is unnecessary to provide twice as many batteries as cars, as is usually supposed, as the road can be operated successfully with an equipment of battery sets only 50 per cent greater than the number of cars on the line.

It is well known that as a battery becomes charged its electromotive force rises. If the charging voltage remains constant the current received by the battery diminishes in proportion as its electromotive force rises. Thus to charge a cell at a given rate requires a constantly increasing charging voltage. If the final voltage were to be applied to the battery at first in its discharged condition a great rush of current would result, which would be injurious to the plates. It is desirable, then, that the charging cells be subjected to a variation of voltage. To accomplish this without the aid of boosters, resistances or counter electromotive force cells, any of which methods would be uneconomical, the plan of operating three dynamos at three voltages was adopted and is working successfully. Three cables having a common negative return extend from the back of the switchboard along the cells on the charging tables. By means of a plug switch the operator upon the transfer carriage can connect each tray of batteries at will to either cable. The discharged battery is first subjected to a potential of 160 volts, which results in a charging current of about 150 amperes. This current gradually becomes less until, when the attendant observes from the ammeter above the tray that it has reached thirty amperes, the battery is changed to the next higher potential, which is 172 volts. The charging current again reaches 150 amperes and similarly decreases, and finally the battery is connected to the highest potential of 176 volts, where it completes its charge and is ready for service.

The controllers were manufactured by the Walker Company and are of special design for the service, as the low voltage and the large currents used require contacts of much larger surface than are ordinarily necessary. The controller has five points and allows the following combinations: (1) The four sets of batteries in parallel, giving about thirty-six volts; (2) batteries in series parallel in sets of two, giving about seventy-two volts; (3) batteries in series with resistance; (4)



SWITCHBOARD.

batteries in series without resistance; (5) the same, with the field of motor shunted.

The illustration on the opposite page shows two of the generators and part of one engine, and a cross section of the method of mounting and connecting the generators is shown on the same page. Here it will be seen that the generator armatures are mounted upon hollow steel shafts or quills resting in the independent bearings PP and pp. Through the center of this quill, concentric with it but not in contact at any point, extends a solid overhanging steel shaft E, supported also by independent bearings Dd. Suitable flanges and couplings are provided at the ends of the shaft and of the quills to connect with the engine flywheels Hh. It is the interior shaft that is peculiar to the Arnold system and gives to it its flexibility. Normally the shaft is idle and the system requires the movement of no more shafting than usual; but in case it is desired to operate a generator by an engine which is not contiguous to it, the shaft is brought into play and is connected to the engine shaft at one end and extending through the hollow quill is connected to the generator quill at the other end. In the present case the couplings are mechanical and the engines are stopped in a short time when the changes are made. This, of course, introduces no serious inconvenience on account of the character of the load, but in a case where it is imperative to operate the generators continuously magnetic couplings are designed to go with the system, and by this means the generators can be shifted from one engine to another by the throw of a switch.

The entire cost of the power plant, when completed, including boilers, stokers, stack, economizer, cooling tower, condensers, piping, crane, foundations, engines, generators, Arnold system and switchboard, capable of delivering 1000 mechanical horse power, is figured at $86 per horse power.

The one uncertain factor is the life of the plates and the cost of repairs on the batteries. Everything else is certain, and is favorable to success. The roadbed is smooth, level and permanent, and the generating plant is the most economical that can be built. The battery shifting device is automatic and requires the minimum of labor and time. The three charging voltages contribute to an economy in charging the batteries, and the management of the road has been intrusted to experienced and capable men. Of the batteries it may be said that advantage has been taken of the experience gained elsewhere, and that the manufacturers have endeavored to produce a plate which will have long life.

The Abner Doble Company at Fremont and Howard streets, San Francisco, are the Pacific coast agents for the Walker and M. C. Bullock companies, and have installed at the Pacific Power Company a 500 H. P. triple expansion Williams engine direct connected to a 300-kilowatt, 8-pole Walker generator. The machine is used for both power and lighting purposes, and has done good service since its installation, about eight months ago. Owing to the larger size of engine and dynamo, they are deemed more efficient than the corresponding machines used at the Englewood and Chicago station.

Distinction Between Energy and Power.

A trolley wire conveys energy, not power, from the power-house to the motor of an electric car. The energy thus conveyed performs no work except in overcoming the resistance of the wire, till it reaches the motor, wherein it is converted into power, which is expended in the performance of work. The boiler of a locomotive does not transmit power from the furnace to the water in the boiler; it transmits that form of energy known as heat. Strictly speaking, the boiler does no work. By a figure of speech we say a boiler "works well or ill," as the case may be; but when we consult our mechanical and thermo-dynamical definitions, we find no warrant for saying that a boiler works or that it transmits power. What it transmits is energy—a very different thing from either power or work. The steam pipe leading to the steam chest of an engine cylinder does not transmit power; it simply transmits the energy generated in the boiler. Only when the steam reaches the cylinder and the piston moves, energy is converted into work, which, when quantitatively expressed in units of work performed in a specified time, is power. On the other hand, rope, belt and shaft transmission, etc., are each examples of power transmission.—Engineer.

Scientific Progress.

Determining the Points of the Compass.

Methods to determine the cardinal points while on the mountains, in heavy timber and brush or upon the featureless expanse of a great marsh, are numerous and reliable enough for all practical purposes unless a very long journey is to be made, which would make it necessary to hold on a fine point while making so long a distance. Notes on the coniferous trees—pines, firs, spruce, cedars, hemlocks, etc.—show that the bark of these is always lighter in color, harder and drier on the south side of the tree, while it is in color much darker, is also damper and often covered with mold and moss on the north side. The gum that oozes out from wounds, knot holes, etc., is usually hard and often of amber color on the south side, while on the northern side it remains sticky longer and gets covered with insects and dirt, seldom drying out to more than a dirty gray in color. On large trees that have rough bark, especially during the fall and winter months, the nests and webs of insects, spiders, etc., will always be found in the crevices on the south side. A preponderance of the large branches will also be found on the warmest or southern side of the trees; also, the needles of all the abovementioned trees are shorter, drier and of a yellowish-green on the southern side, while they will be found longer, more slender and pliable, damper to the touch and darker green in color on the north side. The cedars and hemlocks, as if trying to outdo the others, always bend their slender tops of new growth toward a southern sky. The hardwood trees are equally as communicative, and have all the characteristics, so far as regards their trunks, as the coniferous trees, except the absence of gums; but this is more made up by the fungus growth of mold and mosses that is very noticeable on the north side of these trees. The ledges of rocks, which may be part of mountains, or merely an occasional cropping out here and there in the woods, or, perhaps, some great boulder alone by itself—a silent witness of the glacial period—all alike testify to the effect of light and shade. The sunny side will usually be bare, or at most only boast of a thin growth of brush, dry kinds of mosses that will only grow when having the light, while the northern sides will be found damp and moldy and often covered with soft mosses and ferns. The forest floor on the sunny side of hills, ridges, clumps of trees, bushes, big rocks, etc., is more noisy under the footfall than on the northern side of such places, where the dead leaves and litter are soft and damp, holding more moisture than in places exposed to the light of the sun.

RECENTLY some interesting repetitions of Franklin's classic kite experiments have been made; but with the improved Hargrave kite, reaching altitudes nearly two miles high, and with this new force the phenomena observed are novel. One of the results shown by a long series of experiments is that the electrical condition of the atmosphere during a snowstorm is practically the same as during a thunder shower, the air being charged to an equal degree. Moreover, at the higher altitudes sparks could be obtained from the kite wire even on cloudless days. That the potential of the atmosphere increases with the height also received verification. Some of the experiments were made from the top of the Washington monument, and during severe thunder storms potentials as high as 3000 or 4000 volts were obtained. Observations, in fact, were recorded at other places—at the top of the Eiffel Tower, for instance—of voltages as high as 10,000.

A FRENCH INVENTOR uses a rubber tube as a core on which to mold pipes of cement and sand. To make a continuous conduit in the ground a trench is dug, and at the bottom of this a layer of cement mortar is placed. On this rests the rubber tube, which is surrounded by canvas and inflated. The remainder of the trench is then filled with cement mortar, and as soon as this is set the rubber core can be deflated and removed for use elsewhere. It is stated that six-inch pipes have been made on this plan out of hydraulic lime and sand at a cost of about 22 cents per yard.

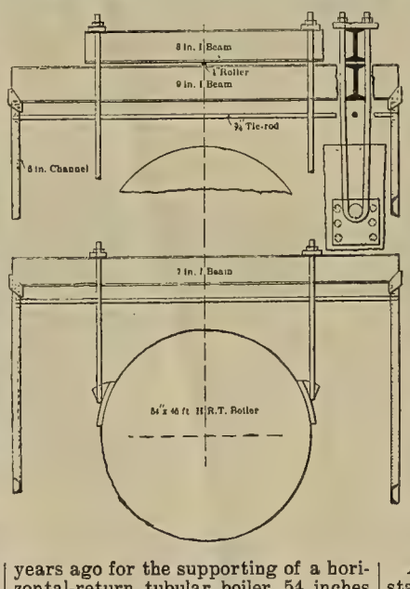
A GLIDING BOAT is a mechanical novelty which has lately been tried in England with success. Two parallel hulls are connected by cross beams, forming a platform on which are placed the engine and boiler. The propeller shaft runs down obliquely into the water. Beneath the hulls are secured flat blades, extending from one keel to the other, and projecting some distance on each side. The flat surfaces of the blades incline slightly upward in front. When the engine is started, the boat gradually rises to the surface; and when a speed of twenty miles an hour is reached, as was realized, only the back part of the blades touches the water.

Mechanical Progress.

A Boiler Setting.

Written by G. W. BISSELL.

The sketch presented herewith shows a method used by the writer about two years ago for the supporting of a horizontal-return tubular boiler, 54 inches in diameter by 16 feet long.



Two pairs of lugs of special design are attached to the sides of the shell above the fire, and at a distance, to centers, of 3 feet 6 inches from the ends of the shell. These lugs rest on hangers of 1-inch round iron, which are carried by nuts on wrought iron saddles cut from 3x1-inch flat bar iron. These saddles rest on I-beams. At the front end of the boiler one 7-inch beam is used. At the back end the saddles are supported by an 8-inch equalizing I-beam 5 feet long, which rests on a 1-inch roller which has a bearing on a 9-inch I-beam. The latter, and also the 7-inch I-beam at the front end, rests on pairs of columns for which 6-inch channel beams are used. Suitable castings serve as sole-plates for the I-beams and as caps for the columns.

Cast iron plates 12x12x1½ inches serve as foot plates for the columns.

These plates are perfectly level on piers of brickwork about 2 feet square, built independently of the boiler setting proper.

Tie rods of ¾-inch round iron hold the columns to place at the top. Longitudinal stability is afforded by setting the channels into the brickwork of the boiler setting, so that the flanges do not project, but are flush with the wall.

It is thought that the following advantages are possessed by this design over others in more general use:

First—Three-point support for the boiler, by which it is freed from strains due to settling of the columns or setting.

Second—Independence of the boiler and the setting, prolonging thereby the life of the setting and making easy the laying up of the new and the repairing of the old brickwork.

The Automatic Clerk.

There have been nearly 3700 United States patents granted on slot machines. The latest is the one recently granted to Mr. Wheatcroft, for his invention, which he calls the automatic clerk. This is the only one of its kind by which bulk can be taken and conveyed to package by the action of a coin. Through the automatic clerk, a grocer can sell peanuts, coffee, biscuits, crackers and starch without the expense of a salesman. The grocer himself can attend to twenty-five of these machines—that is, see about twice a day that they are fully stocked—and be perfectly sure that his profits are not being tampered with. The machine receives the goods at the top in bulk. Peanuts to the value of $10 can be stored in this way. A nickel is placed in the slot by the intending purchaser, and at once a nickel's worth of peanuts passes down a continuous chute, falling thence into a bag, which immediately appears, for the purchaser. To get all this the customer has only to drop his nickel in the slot and pull the handle of the automatic clerk. The machine counts by a register how many nickels are taken, and the grocer can so count his receipts at the end of the day.

The machine is, above all, honest. If a child comes along and puts a penny or a dime in the slot by mistake, the automatic clerk silently returns the coin, as only a nickel can be used. If trade has been unusually brisk and the last of the 1000 bags has been used, a sign appears, saying: "Keep your nickel. This machine is empty." If the silent clerk is placed in the street, woe be to the little boy who should place his hand up the receiving aperture with intent to steal. He will receive a mild, but effective, electric shock that will make him jump.

It has taken the inventor, Mr. Wheatcroft, seven years to perfect his machine, and has cost some $18,000, but he considers himself amply rewarded in the success and utility of his work.

From Tree to Type.

At 7:35 A. M. three fine trees were standing in an Austrian forest. In less than two hours a distinguished assemblage was reading the columns of a newspaper printed on paper made from the pulp of those identical trees. The experiment was made to show the perfection the process of paper making had attained. At 7:35 the trees fell to the ground. The timbers were at once stripped of their bark, cut into small pieces, and converted into mechanical pulp. This was placed in a vat and mixed with the chemicals necessary to form paper, and the first leaf came out at 9:34 A. M., in one minute less than two hours. Some of the sheets were then taken three miles, and the first of the printed papers was issued at 10 o'clock, two hours and thirty-five minutes from the tree.

Answers to Correspondents.

Can you give me a rule for calculating the value of a specimen, when composed of free gold and quartz? For an example, I will say I have a specimen that weighs 4 ozs. Troy, the specific gravity is 36, what is the per cent of gold? C. H. B.

Conconully, Wash., Dec. 21st, '97.

There are several rules for ascertaining the proportion of free gold in quartz specimens, all based on the different densities of the specimens as a whole, of the gold, and of the quartz. The specific gravity of the gold and of the quartz is generally assumed, the former at 17 to 19, the latter at 2.6. That of the specimen is found by weighing it in air and in water, and dividing its weight in air by the difference. In this case, the easiest rule to remember is this: Divide the specific gravity of the gold by that of the quartz and by that of the specimen. From the greater quotient subtract the lesser; the remainder is the proportion of gold. From the lesser quotient subtract 1; the remainder is the proportion of quartz. Then as the sum of these proportional quantities is to the proportion of gold, so is the weight of the specimen to the actual quantity of gold in it. Suppose a specimen weighs 32 ounces in air and 28 ounces in water; the difference is 4, and 32 divided by 4 gives 8, which is the specific gravity of the specimen. If the specific gravity of the gold is assumed to be 17, and that of the quartz 2 6, we have 17 divided by 2 6, gives 6.539 nearly, and 17 divided by 8 gives 2 125. Subtracting the lesser quotient from the greater leaves 4.414, and subtracting 1 from the lesser leaves 1.125; the proportion is 4 414 ounces of gold to 1.125 of quartz. Adding these together we have 5 539. If 5 539 ounces of the specimen contain 4.414 ounces of gold, the whole specimen weighing 32 ounces contains 25 5 ounces. This is correct, provided the assumed specific gravities of the gold and gangue are correct; but, if greater accuracy be desired, proceed thus: Weigh the specimen, a piece of the metal and a piece of the gangue, each in air and water. Divide the difference between the respective weights in air and in water by the weights in air. From the greater quotient subtract the next less, and from that the least. The first remainder is the proportional weight of the metal, the second is that of the gangue; the sum of these is that of the specimen. Having the actual weight of the specimen, that of the metal is easily found, as before.

Suppose a specimen of native silver in spar weighs 84 pounds in air and 73 5 pounds in water; a piece of the silver weighs 27 grains in air and 24 in water; a piece of the spar 20 in air and 12 in water. Then—

Spar in air	20
Spar in water	12
Difference	8 ÷ 20 = 0.400
Specimen in air	84
Specimen in water	73.5
Difference	10.5 ÷ 84 = 0.125

Our claim was located Aug. 30, 1897. On Sept. 8 I gave my partner the paper to record. When he came back to camp in thirty days more I gave him the second, recording the work of a shaft 25 feet deep. He did not send first paper off until he sent last paper, and both were recorded Nov. 1, 1897. I, thinking the first was sent off, wrote the Recorder inquiring about the location. He wrote me it had not come to his notice. Then I told my partner about it. He looked over his papers when he went to town and found it, sent it off and it was recorded Nov. 1, 1897. Now it is all O K. Does the work hold it and make all things right, or must it be relocated to make it a legal holding?

When a location is made any time before May, 1897, does the $100 worth of work have to be done this year or does it take in next year?

Garden Station, Cal., Dec. 28, '97.

Answering the first question, the State law which went into effect May 26, '97, requires that on any California lode mining claims located after that date $50 worth of work must be done within sixty days of posting the notice. If that amount of work was done on the claim before Oct. 30, '97, and proper record made thereof, no relocation will be necessary. Regarding the second question, on any lode claim located after Jan. 1, '97, the $100 worth of annual assessment work required by the Federal Statutes can be done any time before Dec. 31, 1898.

T. T. S., Bodie, Cal.: Cyanide of potassium, 98° in cases of 112 lbs., is quoted at 32 cts. per lb. in New York City. Chloride of platinum, $9 per oz.

G. P. Y., White Hills, Arizona: The population of the United States was estimated by the Treasury Department on December 1, 1897, to be 73,593,000.

F. L. C., Prescott, Arizona: Cyanide of potassium is imported in carload lots from the East, and is not manufactured on this coast. It can be purchased in any reasonable quantity in Denver, Salt Lake City, Los Angeles, or San Francisco. In Los Angeles it is worth at this writing from 32 to 35 cents per pound.

J. W. B., Butte, Montana: Delinquent coowners of a mining claim when served personally with notice, have ninety days from the date of being so served to pay up. In case of publication of notice they have ninety days from the last day of publication, or 180 days from the date of the first publication of notice.

T. C. B., Basin, Montana: There is no "law" to permit the patenting of two or more adjacent and contiguous mining locations by showing that $500 in work and improvement was done on any one of them, but by custom and department usage such action is permitted where it is clearly and satisfactorily shown that such work was for the improvement of the entire claim in common, on the assumption that the mining claim practically includes several lode claims. This is in accordance with a recent ruling, but is not "law" and is liable to reversal at any time.

T. B. F., Downieville, Cal.: The present California mining law went into effect May 26, 1897. Fifty dollars worth of work must be done on lode claims located after that date within sixty days after posting the preliminary notice. On locations made after November 2, '97, it is possible to make the $50 worth of work required under the State law apply and be made part of the $100 annual assessment work required by the United States statutes.

Coast Industrial Notes.

—The manufacture of linen is to be established in the Scotch mill at Salem, Or.

—Portland men have contracted for 5000 sacks of potatoes at Castle Rock, Wash., at 35 cents per sack.

—The Oregon Railroad and Navigation Company has declared a quarterly dividend of 1 per cent., payable January 3.

—Logging camps along the lower Columbia, in Washington and Oregon, show evidences of life and activity, and the price of logs shows an upward tendency.

—Grain elevators are to be built at Flavel, near Astoria, Or. When the Astoria-Gobel road is finished and in operation, wheat will be shipped by vessel largely from that point.

—The Secretary of the Navy has accepted the proposition of the Union Iron Works to establish in the battleship Wisconsin an electric plant for the operation of the turrets and guns and the hoisting of ammunition. The work will cost $11,300.

—Southern California will market 12,000 cars of oranges this winter, about one-half of which will go east over the Santa Fe and the other half over the Southern Pacific, and it is estimated that in five years orange shipments will be two to three times as large. The eastern movement of lemons furnishes a large traffic.

—The shipments of California deciduous fruits for the season 1897 from May 1 to November 30 amounted to 5323 carloads, or 127,752,000 pounds. That was an increase of 1276 carloads over the shipments of 1896, and an increase of 755 carloads over those of 1895. These shipments do not include dried fruits, only fresh fruits.

—Of the 207 shingle mills in the State of Washington, 185 are shut down, and will make no output until after February 1. The daily product of the 207 mills when in operation is 12,560,000 shingles. The mills now in operation have only an output of 1,650,000. By a reduction of the output it is expected to raise the price of shingles from 90 cents to $1.25.

—Imports of merchandise at San Francisco during the first eleven months of '97 were $37,478,300, against $34,073,600 for the same time in '96, and included $8,568,000 from Japan, $6,458,500 from China, $2,244,703 from Great Britain, $9,704,800 from the Hawaiian Islands, $2,635,500 from Central America, $1,600,800 from British Columbia and $1,687,000 from the East Indies.

—President McKinley this week approved the bill prohibiting the killing of fur seals in the waters of the North Pacific ocean, passed by Congress last month. The act prohibits the killing of seals by American citizens, except as they may be taken on the Pribyloff Islands by the North American Commercial Company. It also prohibits the importation of sealskins into the United States, raw, dressed, dyed or manufactured. The penalty for violation of the law is a fine of not less than $200 nor more than $2000, or imprisonment for not more than six months, or both fine and imprisonment, for each offense, the forfeiture to the United States of the vessel, tackle and cargo employed in the illegal sealing being also provided for.

—The S. F. & S. J. Valley Road will bore a long tunnel near Rodeo, Cal. The contract will be let next month. The amount of the contract will be about $450,000. This tunnel is to be 5700 feet in length; the third longest tunnel in California. The longest is that of the Southern Pacific near San Fernando, which is 7200 feet long; the next, that on the Southern Pacific's road to Santa Cruz, which is about 6000 feet long; and the fourth, that on the Southern Pacific's coast extension between San Margarita and San Luis Obispo, a tunnel 4000 feet. The longest tunnel on the coast is on the Northen Pacific line in Washington, 10,000 feet through the Cascade mountains. One of 13,000 feet is to be built on the Great Northern road in Washington.

—There has been a great deal said in the papers recently about the ship-building firm of Cramp & Sons, Philadelphia, locating in Seattle, Wash. These men do not contemplate such an addition to their business, but are anxious to dispose of four vessels that have been on their hands for nearly twenty-five years. In 1873 the Cramps took the contract to build four iron vessels for a concern in South Africa. The vessels were built according to contract and duly registered in Philadelphia. They are of uniform dimensions and of practically the same tonnage capacity. They are named the Pennsylvania, Illinois, Indiana and Ohio. About the time the vessels were completed the steamship company failed, leaving the vessels on Cramps' hands, where they have since remained. The Alaska excitement afforded the builders an opportunity to use the vessels and they were not long in making known that they proposed bringing them to Seattle after giving them an overhauling, and offering them to the Alaska trade. Out of this grew the rumor that they proposed establishing a branch of their great works there. The results are said to be well-made steamships and are regularly listed in the blue book. They are fitted out with modern equipment and probably well adapted to the Alaskan service.

—At Albany, Oregon, the Corvallis & Eastern Railroad has been incorporated; capital stock, $2,500,000. The object set forth is the construction and operation of a railway from Yaquina bay to Snake river in Malheur county, Oregon; also to construct a branch road from a point on the line near Prineville to California through Lake county and the purchase of the Oregon Central & Eastern Railroad. It is said the movement is in reality the reorganization of the Oregon Central & Eastern Railroad for the purpose of extending it eastward. A. B. Hammond, president of the Oregon Central & Eastern, is at the head of the new company and is the chief stockholder. His representatives say he has ample capital at command to carry forward the work. Supplemental articles will soon be filed for the construction of a branch line from a point near Prineville to Pendleton, Oregon.

—According to newspaper accounts, the Alaska Commercial Company has sold its properties to a London syndicate, the British American Corporation, capitalized for £1,500,000. The assets of the new corporation includes the Le Roi mine, Rossland, B. C., and other gold properties. Its principal assets will be the property and business of the pioneer Yukon company, headquarters in San Francisco, including wharves, real estate, warehouses, stores and trading stations for thousands of miles, ocean and river steamers, sailing vessels, launches, barges and lighters, and the whole plant and stock, including merchandise and supplies in transit and at northern depots. Among the properties specified are three stores, with all appurtenances, at Circle City, Forty Mile Creek and Dawson City, trading stores, dwellings and 160 acres of land at Fort Selkirk; townsite property at Dawson City; one-fourth interest in eleven claims on Bonanza and El Dorado creeks; twenty adjoining claims on Bonanza creek; claim 21 on Bear creek; claim 2 on El Dorado creek, which is said to be paying rich returns; claim 2B on El Dorado, and interests in all claims which may be located by parties now prospecting on Stewart and Sweetlarutsk rivers. The English company will continue the mercantile and transportation business of the Alaska Commercial Company in San Francisco, and will engage in banking and mining. Referring to the above, Leon Sloss of the Alaska Commercial Company said yesterday that the British syndidate has no authority to announce that it had absorbed the Alaska Commercial Company. "We have had an offer from the syndicate, but until we see the cold cash there can be no sale. We want no stock; we must have only cash. We are not anxious to sell. We have just let a contract to the Union Iron Works for the rebuilding of the steamer Portland, and the St. Paul, the Dora and the Bertha will all be on the regular and direct run to Alaska."

Personal.

J. A. VEATCH is Supt. Fern mine, Nelson, B. C.

G. EDWARDS is Supt. Mercur, at Mercur, Utah.

F. PRENTISS is Mgr. Boston mine, Sunshine, Utah.

D. FRICOT of Grass Valley is at San Andreas, Cal.

E. T. LOY is Supt. Tennessee mine, Kingman, Ariz.

D. B. HUNT is Supt. Milkmaid mine, French Gulch, Cal.

N. GALLES is Mgr. Swiss Belle G. Co., Galles, Ariz.

CAPT. HALL, Supt. Le Roi mine, B. C., is in Spokane, Wash.

A. C. WHEELER is Supt. Benton mine, near Santa Fe, N. M.

M. K. ROGERS has returned from Mexico to Anaconda, Mont.

J. E. POINGDESTRE of Nevada City, Cal., is in San Francisco.

C. H. WILBUR is Mgr. Golden Eagle mine at Park City, Utah.

J. F. JONES is Supt. White Hills mines, White Hills, Ariz.

H. H. PRICE is Supt. Confidence mine at Whitewater, N. M.

WM. SWANCOAT is Supt. Mineral Point Zinc Co., Hanover, N. M.

A. TURBETT has returned to Salt Lake City from Rossland, B. C.

E. S. THURSTON is Mgr. Squaw Creek mines, Phœnix, Ariz.

H. MATTERN is Supt. Mattern-Ashland mines, Ashland, Oregon.

MGR. ROJAS of the Texas mine, Nevada City, Cal., is in San Francisco.

W. S. SMITH is Supt. Esperanza M. Co., at Guacomea, Sonora, Mexico.

J. S. WOODBURY is Mgr. Spotted Horse mine, Marysville, Montana.

SYDNEY SMITH has returned to San Francisco from Nevada City, Cal.

T. B. DILLON, Supt. Columbia mine, Jackson, Cal., is in San Francisco.

S. G. COLLINS, Mgr. Rialto L. & M. Co., Leadville, Colo., is in Boston.

C. H. DUNTON, Supt. Larkin mine, Placerville, Cal., is in San Francisco.

J. DIAMOND, Supt. Limpensell mine, Placerville, Cal., is in San Francisco.

MAJOR W. H. HEUER, U. S. Engineers, has been in Los Angeles examining qualities and locations of rock in that vicinity in connection with the San Pedro harbor improvements.

J. MEYERS, Supt. Goodyear mine, Mountain House, Cal., is in Sacramento.

O. P. POSEY, Gen. Mgr. Cochiti G. M. Co., Bland, N. M., is in Los Angeles.

C. B KING of Cœur d'Alene, Idaho, is Mgr. Hiyu G. M. Co., Florence, Idaho.

R. C. WALRATH of the Reward mine, Nevada City, Cal., is in San Francisco.

G. SCHMIDT, Mgr. National mine, Buckeye, Cal., has returned to San Francisco.

MASON W. MATHER, Supt. Plumbago mine, Sierra Co., Cal., is in San Francisco.

E. L. WHITE, Victor, Colo., is Mgr. Standard Tunnel Co., Crippie Creek, Colo.

S. B. HAWLEY is the new Supt. of the Mitchell mine at Cripple Creek, Colo.

A. H. TEN BROECK, Supt. Gold B. M. Co., Georgetown, Cal., is in San Francisco.

WM. MCKINLEY, Supt. Providence mine, Nevada City, Cal., is in San Francisco.

H. E. HEPPNER, Mgr. Poorman mine at Lewiston, Idaho, is in Portland, Oregon.

PERCY L. SHUMAN, Mgr. Paragon mines, Mokelumne Hill, Cal., is in San Francisco.

J. M. FRANCIS succeeds his father, J. B. Francis, as Supt. Alma mine, Jackson, Cal.

W. A. HAWLEY of Grass Valley, Cal., has gone to the Cariboo district to take charge of a mine.

LEO VAN ROSENBERG of New York left Dec. 21st for Prescott, Ariz., whence he goes to Colorado.

T. R. JONES, Mgr. Germania smelter, Park City, Utah, has returned thence from San Francisco.

R. A. F. PENROSE, chief owner of the Commonwealth mine, Pearce, Arizona, is in San Francisco.

MR. WALLACE MACGREGOR, chemist and metallurgical engineer, has located in San Francisco.

W. L. HONNOLD, Supt. California Exploration Co., returned to San Andreas, Cal., from San Francisco.

D. B. GILLETTE is Mgr. of the mines recently purchased by the Hearst Estate at Pinos Altos, Ariz.

A. J. CLARK, part owner in the Japan group of mines at Telluride, Colo., will spend the winter in California.

M. J. COMERFORD is Supt. of a 3000-foot tunnel scheme inaugurated by Pennsylvania people at Magnolia, Colo.

A. E. BROOKE RIDLEY, Gen. Mgr. Siemens & Halske Electric Co., has returned to San Francisco from London.

HAMILTON SMITH, representing the London Exploration Company, will arrive in San Francisco from London this week.

J. O. HARRON, Gen. Mgr. and Vice-Pres. the Parke & Lacy Co., has returned from a six-months' business sojourn in Australia.

A. H. RICKETTS, the mining lawyer, has removed his offices to the Claus Spreckels Bldg., Third and Market streets, San Francisco.

SUPT. MILLS of the Merced G. M. Co., was in San Francisco this week with the bullion from the recent clean-up at Coulterville, Cal.

C. E. PALMER is supervising the construction of a $50,000 concentrating plant for the Mollie Gibson and Argentum-Juniata mines at Aspen, Colo.

HORACE F. BURT, third vice-president of the Chicago & Northwest Railway Company, has been selected for the presidency of the Union Pacific Railway Company.

MAJOR L. H. RUCKER, Fourth U. S. Cavalry, has gone to Dyea and Skagway to make investigation of the passes for the purpose of selecting the most feasible route for the Government Yukon relief expedition.

DR. WALDEMAR LINDGREN, of the U. S. Geological Survey, will deliver a course of lectures on mining and metallurgy at Stanford University, but *Science* says he has not accepted a permanent appointment, as has been announced.

PROF. W. B. RISING, Dean of the College of Chemistry of the University of California, has been appointed a member of the American Committee for the Third International Congress of Applied Chemistry to be held in Vienna, Austria, next July. Prof. Rising will be the only representative from this coast.

CAPT. D. L. BRAINARD, who is to lead the Government Klondike relief expedition, is in Chicago, preparing an advertisement for proposals for supplying the food. The advertisement calls for the delivery of 260,000 pounds of food at Skagway not later than February 5th. The more important items are 75,000 pounds of bacon, 112,000 pounds of flour, 5000 pounds of beans and peas, 4000 pounds of butter and 1000 cans of condensed milk. Capt. Brainard says it has been decided not to try to use condensed foods, except milk.

C. B. WINGATE of the Thistle mine, Plumas Co., Cal., who recently went to Scotland to confer with the mine owners there, on his return, recently, went to the Comstock, where he secured an option on the Kinkead milling plant and the C. & C. and Ophir waste dumps, proposing to operate the present Kinkead mill, build another near the Ophir dump, and a cyanide plant, the whole to have a daily capacity of 500 tons. Work was begun, but opposition to permitting a California miner to frame his own timbers and place them in position, on the part of the local Mechanics' Union, has caused a temporary abandonment of the project.

Obituary.

J. F. MAHON, general manager Santa Rita Copper and Iron Company, died at Santa Rita, N. M., December 23.

Mining Summary.

CALIFORNIA.

Amador.

(Special Correspondence).—Work on the Columbia is progressing very satisfactorily. Hon. A. Caminetti, the owner of the property, has bonded it to a San Francisco company. The property had been abandoned in 1878. The new company has pumped the water to the 300 level. The original depth is 350 feet. Machinery has been erected for sinking, with a capacity of 1000 feet. The ledge is known to be 18 feet of low-grade ore. T. B. Dillon is Supt.

Jackson, Dec. 27th, '97.

Republican: The Bellwether at Jackson is crosscutting from the 285-foot level. Fairly good rock has been encountered.

Under the supervision of G. E. Baker, a mill test is being made at the Wieland for ten days. In case the test fails the mine will close.

Work is progressing at the Alma.

Butte.

Two men are engaged developing quartz properties at Union Bar, on Feather river. The ledges show from the water's edge for 200 feet 6 feet wide.

Work is being pushed on the Good Tide mine, fourteen miles from Bangor. A new 10-stamp mill has been erected and ten more can be added, as the new boilers are of 120 H. P. The parties interested are Cincinnati men, who have invested $75,000.

Mercury: Gregory, Cross and Kelly of San Francisco put men to work on the Cherokee property, a part of which Cross, at one time the company's attorney, and Gregory, Supt., located. The men working for Cross and Gregory found their places taken by a force put there by the bondholders' managers, who held possession. Later the Cross men returned, but were not allowed to work. Whether or not litigation will follow, or amicable settlement, remains to be seen.

Calaveras.

In the Thorpe mine at the 600-foot level a large vein of fine-looking ore was encountered.

The San Andreas *Prospect* reports that the California Expl. Co. has relinquished the Gold Hill mine.

J. Tyson has completed assessment work on the Riverside, which presents good indications.

Democrat: During a rise of water in Lost creek, caused by the recent rain and snow storm in the mountains, the ditch of the Forbestown Co. broke near the dam at a point nearly west of Strawberry valley. The break caused a cessation of work in the mines at and near Forbestown, as this water is the only supply they have. A gang of men was set to work repairing the ditch and it is expected water will again be running through it and that the Gold Bank mine, will be started up again soon. The break is about eight miles from Forbestown.

El Dorado.

(Special Correspondence).—Work on the Pine Hill G. & S. M. Co. (formerly the Unity) has been suspended. The property is about nine miles southwest of Placerville and comprises several claims. A great deal of development work has been done on this property. It is owned mostly by South San Francisco people, with whom capital, excepting a few, is not an unknown quantity. The reason for discontinuing development work on this hitherto encouraging property is said to be domestic trouble and a disinclination on the part of one of the holders to furnish all the capital.

Shingle Springs, Dec. 25th, '97.

(Special Correspondence).—The ten stamps on the Boulder, seven miles northwest of Shingle Springs, are dropping continuosly on very good ore, from a ledge of more than ordidary size, and at a depth of about 700 feet.

Creditable rumor states that Robinson & Berry, of Placerville, have finally bonded the old Greenstone, located about two miles east of Shingle Springs. Data obtained from a quondam Wells, Fargo agent place the product of this property years ago at almost fabulous figures. The location is not such as would indicate a gold mine, but its past history as a rich producer is beyond question. There is no vein on the surface. An old shaft was sunk in the serpentine, but no depth of consequence was attained. The systematic re-opening of the property is looked forward to with much interest.

Placerville, Dec. 28th, '97.

(Special Correspondence).—Supt. Keeney of the Ohio, near Greenwood, has found a good sized ore body at a depth of 300 feet, of a very fair grade. Perseverance and a prudent outlay of capital have finally achieved success.

The Lucky Marion, owned by a St. Louis Co., has closed, apparently for the lack of capital.

Greenwood, Dec. 26th, '97.

Republican: It is reported that the Gentle Annie mine has found an 8-foot ledge on the 400 level, and is in the midst of a pay chute that gives indication of being a large deposit of ore.

The Selby is down 213 feet and drifting.

At the Darkin the depth is 250 feet. The five stamps have been running on ore from the 100.

An arrastra is operated on Webber creek by Sacramento men, working tailings from the old Tin Cup mine.

Supt. Husband of the Gopher-Boulder has completed a test run. The results were good; he has cabled the information to the English owners. It is probable they will go on developing.

Kern.

A 20-stamp mill and cyanide plant are to be erected at Kramer for custom work.

Miner: Eight tons of ore from the La Crosse mine produced 53½ ounces of gold, valued at $800. The La Crosse is in the Stringer district.

Nevada.

(Special Correspondence).—Despite conservative overtures and efforts to secure our valley neighbors against harm, it seems we are destined to be continuously hampered by unfriendly agencies in our desired legitimate pursuit of gravel mining under the laws both State and Federal.

The debris from the several properties about You Bet have seven miles to flow before reaching Bear river, and probably fifty miles before reaching the Sacramento. At Colfax there is a dam 30 feet high, built in 1853, proving the possibility of securely building restraining dams. The output of gravel by hydraulic elevator process and by the construction of dams, all of which the property owners are ready to do, could not injure our neighbors in the valley.

We are ready to protect them against harm to their lands, and are desirous to extract the wealth stored in our hills.

Were the Government to purchase the valley lands, contiguous to the river bottoms and allow them to be overflowed, they would command a better figure than they do to-day. The Government might tax the mine owner on his output, whether by land measurement or otherwise, and he would be the last to object and the first to comply.

There are here to-day over 4000 acres of gravel that can be operated by either the drift or sluice process, of which each cubic yard will average 20 cents, and every acre will average 150 feet of pay dirt.

We look of course to Government for some relief in this matter through the building of dams and the operation of dredges, but "how long, O, Lord, how long?"

The mountain debris from this winter's snows will carry in their course much of the tailings, piled 75 feet high before the Sawyer decision, and this in the summer season is charged to sluicing at the Red Dog and You Bet mines.

You Bet, Dec. 26th, '97.

(Special Correspondence).—Work on the Gothard, together with the Delhi, which was recently purchased by the Champion Co., of Nevada City, for $25,000, is progressing rapidly. Supt. Bigelow has eleven men at work, and will increase the force as circumstances permit. The old 1000-foot tunnel is being extended 500 feet, and will cut the vein at a depth of over 800 feet.

North Columbia, Dec. 26th, '97.

The hydraulic North Bloomfield mine will prove an attraction at the Golden Jubilee mining fair.

Placer.

The directors of the Pioneer M. Co. expect to declare a dividend at the quarterly rate of 25c a share, or 10% a year on par of $10. The company has about $130,000 in its treasury. The November statement of the company showed that the average value of the rock mined was less per ton than it had been for the preceding five months, or $15.79 against an average of $19.25 for the five previous months. They consider that $10 ore will meet every requirement and expectation.

The Gold Standard gravel mine, north of Towle, looks promising. A bedrock tunnel is being run. Gravel was encountered in the top of the face of the tunnel, at the 40-foot mark, showing pieces of gold as large as $3.

The Bear River Hydraulic Co. closed for the season because of the winter freshets. As soon as the water will permit work will be resumed.

Herald: Considerable development is going on in old and new claims in the Ophir district. J. Butts is sinking a new shaft near Ophir. He is down about 20 feet.

The Belleview shows encouraging prospects. Brye & Lozano are the owners. A recent clean-up netted them something over $1200.

O. Walters is getting good ore, and the Bowlder, of which C. C. Handy is owner, is running a force, and the prospects are promising. The Gold Blossom is putting in machinery.

Plumas.

The North American, one of the Garnett Con. Co 's properties, has closed down.

A company from New York has united with G. E. and A. E. Shinn to incorporate the Plumas National M. & I. Co. Capital stock, $25,000, of which $5,000 is paid. The purpose is to develop the mine below Spring Garden, and other properties.

Riverside.

The mass of tailings accumulated at the Hoag mine were leased by Bates & Langford, who erected a cyanide plant, a small ten-ton affair. The tailings net a profit of $5.40 per ton; the price for treatment is about 60 cents. Ten tons are treated every day. Mr. Langford took to Los Angeles last week forty-four ounces of gold, worth $18.75 per ounce, $800 for a seventeen days' run.

San Diego.

The new mining town of Camp Todd is in the San Mateo canyon, three miles from its mouth. The district is named Defiance, J. P. Small of Murietta recorder. The district lies in the extreme northern part of San Diego county, and is bounded on the west and south by the Santa Margarita grant, and on the east by the Santa Rosa grant.

Shasta.

The hills are full of prospectors about Whiskytown, and all doing well.

The Jim Dawe mine, near Shasta, was recently purchased by Page, and is being developed.

R. Howk is Supt. of the Mt. Shasta, near Shasta. They are drifting and getting out good ore.

N. Johnson, near French Gulch, has two tunnels on different leads, each 100 feet in on the ledge. The vein averages 16 inches and the ore prospects well.

A tramway will be built from the Elder Bros'. mine to the Iron Mountain railway to facilitate the delivery of 25,000 tons of ore contracted for by the Mountain Copper Co.

Sierra.

(Special Correspondence).—T. F. Garnier has secured a bond on the Homestake, two and a half miles north of this place, and will begin work immediately. There is an 8-stamp mill on the property. The tunnel, 500 feet, cuts a 4-foot ledge of fair grade ore. Work was abandoned on this mine two years ago, consequent upon the owner's death.

Forest, Dec. 26th, '97.

A new tunnel has been started on the Mt. View, near Downieville, to tap the shaft.

The Downieville *Messenger* reports an encouraging strike in the South Fork mine.

Messenger: Fifteen men are employed at Gold Bluff. The mill was started last week.

York & Sons have been crushing ore the past week.

C. York has six men engaged at the Mount Vernon gravel mine, and will continue work there all winter.

Siskiyou.

(Special Correspondence).—A Montana company is prospecting on Scott river, with a view to erecting a dredge. The prospecting work is extensive and sympathetic and if the results are satisfactory the dredge will be constructed in the early spring. The parties are undecided between the Montana and California dredge. The company is operating twenty-seven miles from Yreka. L. D. Graeter, Callahan P. O., is managing the work.

Fort Jones, Dec. 26th, '97.

Journal: The Fernandez placer claim on Cherry creek is ready for a big run as soon as they have water. This is supplied from the snows of Deadwood mountain.

Work at the Blue Gravel mine on Greenhorn is progressing. A new shaft is being sunk to increase the force.

A. Wetzel is driving a shaft at the Katie-May on Greenhorn. The ledge is small but good.

Work is progressing at the Spencer on Humbug in running a tunnel at 600-foot depth. As soon as the tunnel is extended power drills will be brought into requisition.

News: The King Solomon mine will erect a 40-stamp mill next spring, as they find the ore bodies so large as to justify work on an extensive scale.

R. M. Shearer of Cincinnati, O., has purchased the Cartwright & Phillips mine, located at the head of Humbug.

Reporter: On Salmon river, Swain, Newsome & Cleaver have a 5-foot ledge from which they are taking $10 ore.

At the Jumbo, Sawyer's Bar, a 10-stamp mill is running regularly. The ore is low grade, but the ledge is large and handled at small cost.

The Hickey Bros., at Sawyer's Bar, have fitted up with pipe and giant.

The Shumway Bros., Chase and Reed, and K. Dorothy are at work near Sawyer's Bar.

The Hamilton, Smith & Bills hydraulic mine at Sawyer's Bar is being worked under the management of John Hamilton.

The Peterson hydraulic mine on Salmon river has started.

Wm. Burns' giant is kept at work steadily at Sawyer's Bar.

Herbert Finley from a hundred tons of ore netted $28 per ton.

James Tonkin has leased the Fagundez quartz mine below Sawyer's Bar, and is driving a tunnel.

At the King Solomon work has been completed. They begin crushing Jan. 1st; a porphyry dike seamed with quartz of high grade.

The Dannenbrink Q. M. Co., on Knownothing creek, keep their ten stamps busy.

The Salmon River H. M. Co. has purchased and put in operation the Kline and Harris Bros.' properties, and bonded the Moore claims. The latter will require an elevator. A ditch eight miles long was brought from Salmon river, which is being extended to Sawyer's Bar, a distance of five miles. They expect to expend $60,000 fitting up this property. C. S. Fitch is Supt.

Journal: H. H. Hunter & Co., at the Nebraska, have a tunnel 190 feet along the ledge at 250 feet depth. The ledge is 14 inches.

H. Schroeder, of the Deadwood mines, has tapped two additional ledges. A mill is to be erected in the spring.

Billups & Thomas are washing old ground at the Greenhorn on percentage and making wages.

Trinity.

A. P. Haskin has begun hydraulicking near Trinity Center. His property comprises ninety acres. The gravel is from 10 to 30 feet in depth.

Journal: At North Fork C. and G. Schlomer have begun work.

At Cox Bar T. Price has resumed operations on his drift claim.

G. Tinsley is drifting on Manzanita Flat with good results.

The Patterson Bros. are working their hydraulic mine.

T. C. Wright has completed the ditch on the mine at Vance Bar and will commence operations at once.

Chinese are working extensively at Skunk Point and on the old Willshire mine.

At Taylor's Flat the Red Bluff Co. is working day and night.

At Antone's Point C. Kinderman is running a drift claim. He works all the year round and handles the water in the drifts by a pump worked by a gasoline engine.

The Huestis Bros. have leased the Don Juan placer mine to Uhlberg & Campbell. This comprises 100 acres and is well equipped.

Stetson & Southern are ground sluicing.

W. D. Moody has a bank of gravel containing forty acres, which he is working.

At Cedar Flat the Trinity P. M. Co. has resumed work, under Supt. Harvey.

Tuolumne.

At the Potato Ranch mine, the property recently bonded by Wm. Sharwood, drifting is being prosecuted north and south on the vein from the 100 level. The vein is 7 feet, heavily sulphureted and of high grade.

Sinking at the Grizzly continues in the new shaft. Progress is being made in high-grade quartz.

Gen. Mgr. Buckminster of the Santa Ysabel G. M. Co., has returned to Boston from his visit to the mine.

Reports from Cherokee continue favorable. The tunnel in the Philadelphia ran into a body of high-grade ore. The Carlotta G. M. Co. continues taking out ore and will ship a carload this week.

In the McNear mine sinking is carried on.

Work has been resumed on the Washington on Indian creek.

The Green, near Shaw's ranch, is being worked again.

The Sell mine has 22,000 tons of ore on the dumps, which it is claimed will work $8 to the ton. A 10-stamp mill is to be erected at once.

The Ready shaft is through the pay chute 200 feet, striking a good vein 5½ feet.

Democrat: A piece of float quartz was found by Ackerson & Phelan, recently, three-quarters of a mile from Corcoran Flat. The finders set out to prospect for the ledge the quartz was broken from and found a big vein, but cannot yet determine if it is the one they are looking for.

Independent: The Dead Horse is employing forty men and taking out considerable ore.

O. C. Wilbur is opening up the Stanley and Gladstone, near Jacksonville, with encouraging results.

At the Lady Washington development is reported satisfactory.

The Harriman G. M. Co. is sinking on good rock in the Skinner and Sonora, near Jacksonville.

The Pennsylvania and Carlotta have been producing rich rock for several weeks.

The Confidence mine is going down on the old shaft.

The Providence is pushing development vigorously.

The 20-stamp mill at the Maryatte, near Tuttletown, is nearing completion. The mill will be run by water and 4000 feet of pipe will have to be laid.

The Arbona has resumed operations, and the new 10-stamp mill will be started on its work permanently at once. The hoisting works were completed last week, and it is the company's purpose to go down 1000 feet on the ledge.

A 10-stamp mill is to be completed and in running order in thirty days on the Sell mine, near Sonora, recently acquired by the Tuolumne County M. & D. Co. of Fresno.

Democrat: Work has started on the Terzich. The property is owned by M. Terzich of Sonora, who has organized a company, and, with himself as Supt., operations are pushed. The vein is a pocket and free milling proposition. The mine has been developed to the extent of two shafts, each 150 feet deep, and three tunnels, each 150 feet. The vein has an average width of 4 feet. It is the intention to erect a mill.

N. W. Moodey, Pres. of the Tuolumne M. & D. Co., says a 10-stamp mill will be erected on the Sell mine; 20,000 tons of ore are on the dump; average, $8 per ton.

Work on the south extension of the Providence has been resumed on the main shaft, which is 75 feet and being driven at the rate of 8 feet per day. A 25-foot crosscut tunnel was run to tap the vein and the latter drifted on for 125 feet. There is 20 feet of vein matter, including 14 inches of quartz, that mills $8.50 per ton in free gold, besides rich sulphurets.

The shaft on the Free Coinage is 100 feet, and crosscutting has commenced for the vein. The mine has no mill nor hoisting apparatus. J. M. Haskell is Supt.

Ventura.

On Dec. 25 fires were started in the furnaces of the California Asphaltum Co. and the works assumed their former activity, having been shut down three months to make extensive improvements.

Yuba.

F. W. Page, Mgr. of the Brown's Valley mines, has again assumed charge. The directors of the corporation have refused to accept his resignation. Work is still going on in the 800 and 900 levels of the Pennsylvania, which belongs to the Webb Co., and they are running drifts to get the pay chute which was so extravagantly rich from the top level to the 700.

H. Davis, prospecting at Brownsville, recently came upon a 40-lb. chunk of quartz showing free gold, occasioning considerable interest in that section.

W. Wolf of San Francisco is developing a quartz lode near Dobbins, and will place a prospect mill on the property at once.

M. Beever found another pocket at Rackerby and the first day took out $100.

Democrat: J. Johnson has transferred forty acres and a quartz claim in Brownsville district to J. A. Poingdestre, who has also bonded the Miller claim. Both have been worked to a depth of 50 feet and the prospects are very good. He expects to erect a mill, hoisting works and cyanide plant.

At the Johnson mine, near Brownsville, working under bond by J. C. Campbell, ten stamps are kept busy; at the same time men are putting in a cyanide process. The difficulty in this claim and others in the Brownsville district has been to save the fine gold.

NEVADA.

At the Chainman active work is in progress. The management is erecting a mill. The ore averages about $15 in gold per ton.

The Robust at Ely is being developed, and has a shaft 75 feet. At that level they uncovered 5 feet, showing $12.50 per ton in gold.

The Jupiter at Ely has a shaft 60 feet and ore running $18 a ton. Next season a mill will be erected. D. Peters & Co., Ely, are the owners.

The Johanna shows ore that runs $36 per

ton. The deepest workings are less than 60 feet.

W. J. Nelson, Mgr. Boston-Nevada Copper Mining Co., Yerington, says his company is working but fifty-four men now, but shortly will have many more at work. He says the mill will start up again this month. His payroll at the present time amounts to $9000 a month. His company has spent $112,000 on the mill and mine.

The Chainman mill has resumed operations. T. Smith, from Angels, Cal., is in charge. On the payroll are 75 men.

OREGON.

Ten tons of ore from the Free Coinage produced twenty-one ounces in gold. The concentrates went $150 per ton. The ledge is 3 feet wide and is seven miles east of Ashland.

Hawley, Plummer & Corbus have bought Sharp Bros.' nine placer claims on Powell creek near Ashland for $10,000 and are working them.

The new strike in the Tom Paine mine, near Baker City, assays $25.83 per ton.

At the Worley mine, near Granite, they are sinking 300 feet and preparing for a 10-stamp mill to be erected in the spring.

There are twenty-five men at work in the Belcher, which was purchased for $30,000 by a Utah company.

The Virginia is sinking on the ledge.

The clean-up after seventeen days' run on the Braden, near Gold Hill, was 100 ounces of gold.

Beekman & Huffer are in 300 feet on their tunnel.

The Powell Creek placer mine was sold on the 18th to J. H. Hanley, H. B. Plummer and B. F. Mulkey for $10,000. It is twenty-five miles west of Ashland and embraces 200 acres.

W. H. Reed has purchased the Hammersly mine and is pushing work. A drift was started on a vein 8 inches thick, which has increased to 2½ feet, and the rock runs $75 to the ton.

The Browning & Hannum, on Grave creek, in southern Oregon, has a 2-foot ledge at a depth of 100 feet. Since May 1st it has produced $8000.

Batchelder & Pracht of Portland are the purchasers of the Ollie Woodman mines at Sparta.

Miller & Lane of East Eagle have struck a large body of good ore.

Rich ore was unearthed in the Grey Eagle near Sparta, which J. A. Wright is developing.

The placer miners at Sparta expect to begin piping February 1.

WASHINGTON.

The first shipment from the Cleveland mine at Springdale, under Leason & Tinsly, was made last week.

There is much activity on Toulou mountain, six miles from Bossburg. The mountain is said to be a mass of mineral and is covered with claims, of which the Scotia is one of the best developed, with 180 feet of tunnel and a 56-foot shaft. A diamond drill is to be added to the equipment. A notable strike was made on the Nickel Plate, which showed up a good ore body. The Clyde-Mohawk Co. is operating with a full force.

Development on the Silver Dollar at Bossburg is showing galena running thirty ounces in silver.

In Springdale, seventy-five miles from Spokane, much development is in progress. The claims are generally high grade, silver-lead propositions predominating; some bodies of copper ore have been discovered varying from 2½ to 45 per cent copper and from a trace to $10 in gold.

G. B. Henton of Ellensburg recently expressed ninety-two ounces of gold nuggets from the Elliott mine, near Springdale.

A. Marsh found a nugget weighing 4.9 ounces on the Salmon river, Idaho.

BRITISH COLUMBIA.

Farrell & Midgeon's mining interests at Boundary Creek passed under the control of McKenzie & Mann. The price paid is upwards of $100,000, and 25 per cent has been paid in cash.

The shaft on the American Eagle at Grand Forks shows a vein of 6 feet that assays from $20 to $60 in gold.

G. E. Pfunder has lifted the bond on the controlling interest in the Virginia at Rossland at 12½ cents per share, putting a value on the mine of $62,500. A 6 cent assessment has been levied, creating a working capital of $30,000 to push the work of development.

Four mines are shipping through Silverton—the Comstock, Vancouver, Fidelity and Silver Nugget.

The Stranger at Kaslo shipped a car of ore last week.

The sale of the Curlew at Rossland was made last week for $30,000 cash to an English company.

The International Gold-Copper M. Co. of Rossland, floated last year with a capital of a million, has gone to the wall. Stock was offered at 3 cents, and it has been declared that $12,500 of shares was sold.

The thirty days' run of the Golden Cache mill, Lillooet, gave 900 ounces amalgam from 750 tons milled. About 75 per cent of gold will be saved on the plates. The clean-up will average $4.50 per ton.

The Red Eagle M. Co.'s plant at Rossland has been sold by the sheriff to J. W. Boyde for $2184.40.

The Wasa group at Rossland has been bonded to H. Croft of Victoria for $20,000.

W. Braden of the Pilot Bay smelter says that about 2000 tons of ore so far has been milled and the result is over 500 tons of concentrates, which will probably average from seventy-five to eighty ounces in silver and 70 per cent lead. The ore that has been milled comes from the Lucky Jim and Tariff mines and some from the Blue Bell. Ore has been struck at the lower or 300-foot level of the Tariff mine, and at that depth the ore body is 3½ feet wide, assaying about forty-five to fifty ounces in silver and 76 per cent in lead. The ore on the surface showed a width of 18 inches. The level so far is the lowest obtained in the Ainsworth camp. The aerial tramway, 1500 feet long, from the mine to the lake is completed and is in good running condition. It is bringing down about fifty tons per day. The Tariff mine is employing thirty men. The Lucky Jim is down to a depth of 280 feet and shows 10 feet of ore. The vein has varied from 4 to 14 feet in width and a vast amount of work has been done on it. It is twenty miles above Kaslo and a 1200-foot tramway carries the ore to bins on the Kaslo & Slocan Railway. Twenty-seven men are employed and about 100 tons per day is being brought down. The ore concentrates about four to one. The capacity of the concentrator at Pilot Bay is 200 tons per day, and as a result the Blue Bell mine is not being worked steadily.

The Le Roi Co. made payments of $21,000 last week on its new smelter at Northport. Construction of the smelter was begun in August, '97. Since then the Le Roi has paid $200,000 in dividends, built a $100,000 smelter, and expended about $10,000 in permanent improvements at the mine. The company has decided to pass the usual monthly dividend, as the completion of the smelter will stop ore shipments to the outside smelters, and the company will also have to set aside a fund for the operation of the new plant and the purchase of ore. The ore in the lower workings of the mine carries a large percentage of silica, and to treat this ore advantageously the company will buy ores from other mines which are heavier in iron and carry a smaller percentage of silica. At the start it will also want some ore heavy in copper. A large fund will therefore be required to carry the company's own ores and the ores it will buy from other mines. It is expected that the smelter will start Jan. 15th. The Le Roi Co. has practically completed its 75,000-ton contract with Heinze, and from now on will deliver its entire output of 250 tons daily to its own smelter. It has been rushing deliveries to Trail to complete this contract, and the smelter there will have 13,000 or 14,000 tons of ore on hand when the Le Roi makes its last delivery.

The Payne mine employs 120 men, the largest of any mine in the Slocan. The Idaho employs sixty-eight men.

THE KLONDIKE.

Klondike gold runs from .760 to .835 fine in gold, from 160 to 235 fine in silver and averages about five points base metal. The amount of government mint charge is one-eighth of one per cent of the total value for assaying. A charge of $1 per 1000 ounces, and from 1000 ounces, one-tenth of one per cent per ounce is made for melting. For bullion 700 fine or over, there is a charge of four cents per ounce for refining. A charge of two cents per ounce is made for 1-11th standard weight for alloy. Passengers who left Dawson City Nov. 27th are inclined to discount the stories of starvation there. They say the food situation at Dawson is not alarming, that there is more alarm over the situation outside than is felt by the people at Dawson, who, while they have not a surplus, have sufficient supplies to last them until in the spring. Whatever danger of starvation existed has been averted by the exodus of a large number of people from Dawson to Fort Yukon and the departure of a great many people up the river to the coast. The most serious shortage is in candles and oil. They report that recent prospecting on Hunker creek proves that it will rival El Dorado and Bonanza creeks. At Forty-seven, above Discovery on Hunker creek, the pay streak is found to be 80 feet wide, with 4 feet of gravel, averaging $4 to the pan. At Fifty-one, below Discovery, the pay streak is claimed to be 280 feet wide, with 4 feet of gravel, running from 25 cents to $6 to the pan. The Hunker creek gold is also said to be the best quality found in the district. On Dominion creek prospectors have taken out as high as $17 to the pan, but the gold is in streaks. Skookum gulch is also peculiar in the fact that all the gold found there is in nuggets. Speaking of the rush to file claims, one of the late arrivals on the Alki, who left Dawson City Nov. 27th, says: "For some time before I left the Commissioner's office was unable to accommodate the miners. The men stood in line for days with the mercury 40° below zero in order to file." Beef and mutton at Dawson are being sold at $1.50 per pound. Nothing in the food line can be obtained from the companies without an order. Flour was selling from outfits at $100 per sack, while bacon and beans brought $1 to $1.25 per pound. There was plenty of sugar at 30 cents per pound. The claims are all taken to within a radius of forty-five to fifty miles of Dawson. About 300 men are camped at the mouth of Stewart river, which stream they will prospect this winter. No new gold discoveries are reported. The amount of gold brought out from Dawson by those on the Alki is estimated at $50,000.

ONTARIO.

R. McMillan of the Mikado mine, near Rat Portage, reached town within the past few days, bringing with him a box containing the results of the last run of the Mikado mine—six bricks aggregating $13,000.

A. Nash possesses in the Nyzam mine near French Narrows a low-grade proposition; the vein is 7 feet, assaying from $3.50 to $8 per ton.

UTAH.

On the Eureka Hill, Tintic, which has produced several millions, the shaft is 1100 feet; an air compressor, piping for the shaft, which is to be 6-inch double screw, 3000 feet of smaller pipe for the different levels, and twenty additional stamps, with necessary tables and pans, are to be added.

Since the Overland has been conveyed to Gill S. Peyton, and the Malvern to P. J. Donohue, at Mercur, the district has assumed new life.

The Moonshine group of seven claims at Mercur has been sold to D. W. Kimball of Boston, who has men at work.

The controlling interest in the Malvern M. Co. at Sunshine was transferred to London people through P. J. Donohue, the purchasers paying on a basis of $150,000 for the property.

F. K. Bodine on the Bimetallic at Five-Mile Pass is putting down a shaft 300 feet.

J. Dean is developing the property of the McKinley M. Co. at Ophir.

Development on the Shoebridge-Bonanza at Silver City has begun.

T. G. Merrill has let a contract for work on the Gracie, part of the Pocahontas group, Silver City, and started work.

Drake & Anderson let a contract for work on the Murray Hill group.

Work of sinking on the North Star, at Silver City, has resumed.

The Homestake has reached a depth of 500 feet

Sinking on the Buckeye, at Silverton, has resumed and will continue until the 600 is reached. There is some good ore on the 400 level, showing gold, silver, lead and copper.

IDAHO.

The Poorman at Lewiston will have a 5-stamp mill in operation by March 1st. The Poorman has a tunnel on the ledge about 400 feet. The ledge is 4 feet wide, about half the ledge being a pay streak on the hanging wall. Assays show $85 in gold and $65 in silver. There are five stamp mills in the camp, and it is said that next season will see the number doubled.

The Monolith mine at Shoup is said to have encountered a 2-foot ledge that will prove one of the best bodies of ore discovered in the State.

J. Schoner at Grangeville has six locations, on all of which good quartz has been found. On the Yellow Rose are a 103-foot tunnel and a 30-foot vein, a 30-foot tunnel on the August Flower with a 3½-foot vein and a 40-foot tunnel on the Grangeville, with a 3-foot vein, which is said to assay $87.95 gold per ton.

MONTANA.

The number of men employed in and about the mines of Butte is at present about 5000. They are divided as follows:

Anaconda mines	1600
Boston & Montana	700
Parrot	400
Montana Ore Purchasing Co.	300
Colorado	300
Butte Reduction	350
Alice Co.	225
All others	1100
Total	4975

WYOMING.

The Dillon mine at Rawlins is now in condition to supply the increasing demand for its coal.

A copper vein 10 feet wide has been reached in the Charter Oak mine, owned by the Seton Karr syndicate, in the Battle Creek copper district. The ore is rich in copper and carries $5 a ton in gold.

COLORADO.

There are four leasers in the Giles M., Cripple Creek. At the point of the strike there is a pay streak 30 inches wide, one-third of which is of smelting quality, and the other portion good mill dirt. The smelting ore averages $73 per ton in gold.

The Morning Star for the past year has yielded $5,000 per month.

Whiteside, Summers & Co., on the Vindicator, received from their first shipment $118, $54, and $20 respectively.

The Herrington is producing an average of twenty-five tons a day, making the output between $1,500 and $2,500 a day.

At Sunnyside two deals were consummated last week. One was by K. McDonald and S. Sargent, of the Pennsylvania mining property to a company of Boston men, the purchase price being $50,000, with a payment of $15,000.

The sale of the Silent Friend was closed within the past few days to Eastern men.

Pennsylvania capitalists, headed by S. Heilner, the coal baron, have undertaken to run a tunnel into Magnolia hill, a distance of 3000 feet. The tunnel at 40 feet cut a lode of whose existence no one knew. The object is to cut the Pickwick group of mines low down. At present hand drilling is being done, but plans are being made to put up a large water power plant at the mouth of the tunnel and use compressed air drills. A dynamo for lighting purposes will also be put up. The tunnel is double width and has two tracks. M. J. Comerford of Magnolia is Supt.

The Rialto L. & M. Co., a Boston company, has let a contract for 500 feet farther on Iron hill, Leadville. They have erected machinery at a cost of $8,000, and propose to go down until the underlying wealth of the camp is demonstrated.

The Strong, at Cripple Creek, is making shipments, averaging twelve cars per day, ranging in value from $40 to $70 per ton.

Returns received from two shipments from the Gold Sovereign, Cripple Creek, ran fifty and twenty-seven ounces per ton.

Carruthers & Levy, of Cripple Creek, are producing five tons per day, averaging three ounces.

Redd & Co., of the Australia, on Beacon hill, have opened a vein 2 feet wide, assaying from $18 to $26 per ton.

The Puritan, at Yankee hill, is shipping $60 ore from an 18-inch vein.

The Maggie Trimble, at Yankee hill, is showing a 4-foot vein of from $20 to $40 per ton, at a depth of 12 feet. The shaft is to be sunk and machinery put on.

The Bonanza King, at St. Mary's lake, has a 4-foot vein of copper ore.

The Specimen shipped during the past week fifty tons of ore of an average value of $43.

The Alice property, at Yankee hill, was sold for $250,000, and the Cheasapeake for nearly $30,000, to Eastern investors.

It is reported that the Star of the West, at Silverton, has been purchased by a California company who propose to develop the claim, and expect to take in the Pyramid, Demosthenes, and several adjacent. The company proposes to build a fifty-ton concentrating mill. A. B. Elis, the Gen. Supt., says the work will begin at once.

The old producers at Ouray, the Bachelor, Wedge, Revenue, Camp Bird, O. and N. Tunnel, American, Nettie and others are keeping up their daily shipments of ore. The Bimetallist has been added as a shipper.

T. F. Walsh, in connection with his Camp Bird mine, is about erecting a large mill for concentration of low-grade ores near Ouray.

The Big Six mine at Leadville struck a 2-foot ore body, assaying eighty-nine ounces silver and a fraction in gold. There are two tons blocked out that will run $1800 in silver to the ton.

The tunnel in the Eldora at Boulder has been driven 80 feet, and the vein encountered is a solid mineralized body 4 feet wide, representing in value $800 per ton.

The year's production from the Vindicator, Cripple Creek, will aggregate 9000 tons, with an average value of $35 per ton.

Fifty leading mining men of Colorado met in Denver last week to organize an association for mutual benefit. The association proposes to have jurisdiction over everything pertaining to the mining industry which may affect more than one mine. The matters of freights, smelting charges, milling rates, labor compensation, etc., will all be considered, and the relation of railroad rates to ore values will receive special attention, so that no matter where a mine may be located, it will receive protection to the full power of the association.

A Denver dispatch of Dec. 29 says: The books of the United States Branch Mint for the year 1897 are now closed. The deposits of gold are the largest ever received. The total will slightly exceed $12,200,000, and a conservative estimate made by the mint officials places the entire output of Colorado at $22,000,000 in round figures.

At Leadville the Arkansas Valley smelter employs 550 men. The works are receiving 450 tons of ore daily from that camp, mostly from Breece Hill, the Ibex, Sedalia, Alzar and Resurrection being the heaviest contributors of lead-silver.

The Ingram at Salina continues to ship from fifteen to twenty tons daily.

The Tambourine made a shipment of good ore from Salina.

A strike of $400 ore is reported in the Last Chance at Delphi. The ore is in a 12-inch vein of sylvanite.

At Eldora the X Ray, Maude W., Delaware, Revenge, Gold Coin, Bonanza, Populist, Enterprise, Clara, Denver Group, Village Bell, Independent, Apex and Antietem are shipping ore.

News-Reporter: Iron is to-day the great product of Leadville. The much despised mineral of the early 80's that was thrown over dumps in the early history of lode mining in Lake county is now the salvation of Leadville. As a flux the iron produced from the mines of this district is unrivalled and finds its way to all smelters in the country where lead is used as the base of reducing ores. The high excess of metallic iron over silica makes it valuable as a flux in the reduction of refractory or dry ores, whilst the low percentage of phosphorus contained in the metallic iron makes it available for the manufacture of merchant bar and railroad iron in iron and steel furnaces.

The iron product of the Leadville mines finds its way wherever the value of the ores will bear the cost of transportion. Large shipments are made to the smelters of Durango in the extreme southern portion of this State, to Pueblo, to both the lead furnaces and the iron works at Bessemer.

The Globe and Grant smelters at Denver receive almost their entire supply from this locality, and the Illinois steel works find the iron and manganiferous ores of our mines far superior in the manufacture of Bessemer steel to the foreign product. In fact the only competitor we may have in the future in the Illinois and Ohio ore markets will be the Lake Superior iron mines which for years have held the monopoly of this trade on account of the superiority of their product which consists of an ore containing 66 per cent of metallic iron and only a trace of phosphorus. In the early days of mining in Lake county when the outcrops of the carbonate formation was first discovered and were as a rule high grade ores in an oxidized form, quality and not quantity was sought, as smelting was at that time in its infancy and high smelting charges prevailed, not that the smelters made exorbitant profits at the uniform charge of $25 per ton, as very often 25 per cent of the mineral contents of the ore went over the slag dump. As time progressed improved appliances were built in the smelters and a familiarity with the ores remedied the defects and smelting charges gradually decreased until at the present time ores that in 1879 and '80 were thrown over the dumps as worthless now return a good profit. It is safe to say that 75 per cent of the product of Leadville's mines now consists of the manganiferous ores and low grade carbonates that were considered worthless in the period referred to. While the values may not be so great as in former years, yet employment is given to a greater number of men and a greater proportion of the value of the product remains at home among our people. It costs just as much to break and hoist a ton of iron worth $6 or $7 as it does to mine and raise a ton of 200 ounces carbonate or sulphide ores, and as there is a great deal more of the former lying around the hills than there is of the latter, the miner working for day's pay, and the merchant depending for his trade on the miner's earnings, have no ground for complaint.

NEW MEXICO.

Fifty tons of iron ore per day is being shipped from the Santa Rita Copper and Iron Co.'s claims.

Davidson & Bell are sinking the shaft of the Golden Giant, near Bland, below the 450-foot level. They are taking out sufficient good ore from the 350 and 450 levels to keep the mill running.

Schriner, Hills, Rogers, Wilde, Sweet and

Jaccarn, of St. Louis and Kansas City, have organized the Rio Arriba Placer M. Co. for the operation of mines in Rio Arriba county.

At Pinos Altos, on the mines purchased by the Hearst Estate, D. B. Gillette proposes to conduct water thirteen miles to the mines and to install a complete electric plant. The improvements are being made at a cost of $100,000. Mr. Gillette is sending a carload of ore daily to the smelter.

Over 100 tons of ore per day is being shipped from the Confidence mine to the Co.'s mill at Whitewater; thirty stamps keep at work.

The ore body in the Copper Queen, Grant county, is from 5 to 12 feet wide, the values being equally divided, one-half gold and one-half silver. There are 1000 tons of ore on the dumps which will run from $40 to $50 per ton.

G. Young, near Silver City, is taking out ore which runs 18 per cent copper, $4 gold and six ounces silver.

Brockman & Hughes have a good body of 16 per cent copper ore on the Hanover, in Grant county.

The Mineral Point Zinc Co.'s claims shipped five cars dry bone (zinc carbonate) to the Co.'s works, at Mineral Point, Wisconsin, last week.

Biggs & Doyle struck a body of copper ore on one of their iron mines near Hanover last week.

The copper ore discovered in the Hanover mine, in Grant county, holds out both in extent and richness.

A force is employed in development on the Western Belle. The ore vein is 14 inches and assays from $40 to $70 gold per ton.

The Cochiti G. M. Co. has incorporated under the laws of New Jersey. Capital, 150,000 shares, par value $10. The incorporators and temporary board of directors are as follows: J. A. Coram, L. T. Trull, S. H. Stern, C. E. Rushmore, W. B. Crisp, H. S. Gans.

ARIZONA.

The gold property known as the Bonancita placers, situated near the Yaqui river just east of Guaymas, has been sold. The new company is officered by J. W. Garrett of the B. & O. R. R., Pres. G. Turnbull is Mgr. T. C. Cox has been appointed Supt.

The Crowned King, near Prescott, produces $186,250 per year, averaging $28 85 per ton. G. P. Harrington is Supt.

Near White Hills A. L. McKeown has 150 feet on a 26-foot vein. The ore averages $7 a ton.

On the Gladiator, near Prescott, there are six tunnels. The work runs steadily. A Falco is Mgr.

The Mammoth M. Co., in Pinal county, is making its shaft double compartment to the depth of 600 feet and enlarging its 50-stamp mill. Cyanide works will be erected to work the tailings, of which there are from 100,000 to 200,000 tons, estimated to contain from $9 to $13 per ton gold.

The Congress G. Co. at Congress Junction contemplates some new stamps, and after the two additional hoists are in perfect order the company will probably put in twenty new stamps. W. F. Staunton is Supt.

At the Vulture in Wickenburg they have fifteen men working on tailings, operating a cyanide plant. Results show $2 to $15 a ton on twenty to forty tons daily. H. Helm is Supt.

R. W. Baxter is working two men on the Trilby, in the White Picacho, twenty miles east of Wickenburg. A year's bond for this property was given for $25,000. The shaft is 80 feet on a 2-foot ledge assaying $200 in gold per ton.

There are said to be 150 prospectors doing work within a radius of twenty miles of Wickenburg. They have been working dry washers, but recent snows will enable them to improve on this method.

Clark & Hoyt have bonded mines near Pearce for $30,000. The bond contains stipulations assuring extensive development.

The Springfield M. Co., near Kirkland valley, has completed a 10-stamp mill. Sufficient ore is blocked out to keep the stamps falling for five years. The ore averages $60 per ton.

MEXICO.

The San Jose gold and copper mines, owned by the Nicholas Chemical Co., of New York, control 5000 acres of mineral land. Six mines are worked within this area. The smelting works are in successful operation, yielding between one and two tons of bullion per day, value $300 per ton in gold and copper. The production of the mines is at present limited to the capacity of the plant, about forty tons per day. Native labor is from 25 cents to 37½ cents per day. Coke costs $12 per ton at the smelter; freight on bullion to New York is $11 per ton from Tampico.

The Continjencia mine, near Nogales, is a gold, silver, and copper proposition, on which development work is in progress. The shaft is 82 feet; at this depth there is 13 feet of ore, an average assay yielding $8 gold, twenty to fifty ounces silver, and 20 per cent copper.

The San Miguelita, at Nogales, a gold and silver property owned by Reardon, Shay & Shutz, is fairly well developed, with a 10-stamp mill in active operation. The ore carries from an ounce to one ounce and a half in gold, and twenty ounces in silver to the ton. The shaft is down 400 feet; the ore body is from 3 to 6 feet in width. It is under bond to Gov. Thornton of N. M., and Gov. Grant of Colorado.

At the Esperanza and La Francisca M. Co. at Guacomea, Sonora, work is progressing, and a 20-stamp mill is in course of erection.

The Copper Queen Co. of Bisbee, is developing the Pillares at Nacosari. The depth is 300 feet, showing the ore body from 60 to 100 feet wide, bearing from six to nine per cent in copper. The ore body is nearly 1000 feet long, and extends within 50 feet of the surface to as far as development work has opened it. The camp is 102 miles from Bisbee, Ariz., on wagon road. A. Danforth is Supt.

Commercial Paragraphs.

THE Hercules Gas Engine Co. is supplying a 45-H. P. gasoline engine for a wire ropeway over Chilcoot Pass.

J. F. MERRILL, of San Francisco, has secured a contract from the San Francisco and San Joaquin Valley Railway Company for 8000 steel rails for $250,000.

THE Westinghouse Electric and Manufacturing Company has the contract for equipping the tramways and power houses at Glasgow, Scotland. These tramways are to be seventy miles in length. This concern has also received a contract for the street lighting plant of Malaga, Spain.

THE three furnaces of the Mountain Copper Company, Ltd., Keswick, Cal., will be supplemented by the addition of two more as rapidly as they can be put into place. The new furnaces are especially designed for smelting the fine ore, but can be used in the same manner as are the furnaces at present in operation. The powdered ore is the richest grade that comes from the mine, but the inconvenience of handling this product has been quite a drawback. To overcome this Parke & Lacy, 23 Fremont street, San Francisco, designed a roaster that is a success, and from this roaster the ore will be elevated to the smelters. The roaster has a capacity of 100 tons per day and the cost of putting the plant in place has been considerable. A half million brick were used in the construction of the oven exclusive of the flue, which when completed will be the most imposing stack at the works. The company is preparing quarters for large additions to the force. The increased capacity will necessitate the employment of probably 300 more men.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING DECEMBER 21, 1897.

595,845.—CARPET STRETCHER — Ansley & May, Davenport, Wash.

595,757.—CHOPPING BOARD — J. B. Biles, Elma, Wash.

595,761.—BROOM—H. Brockmann, Santa Rosa, Cal.

595,935.—CIGAR BOX—C. A. Coey, Fairfield, Wash.

595,700.—VEHICLE WHEEL—J. T. Davis, S. F.

595,806.—ENVELOPE—S. M. Edwards, Los Angeles, Cal

595,875.—TENT—J. W. Ernest, Los Angeles, Cal.

595,715.—WAGON—G G. Kaiser, Johnson, Wash.

595,778 —SPRINKLER—E. A. Knoop, Monterey, Cal.

595,915.—FUSE CUTTER—E. A. Langford, Washington, Cal.

595,885 —STOP COCK LOCK—R. B. Mullen, Tacoma, Wash.

595,9 9.—WATER ENGINE—W. R. Phillips, Seattle, Wash.

595,788.—BENZINE APPARATUS—Small & Stillman, Sacramento, Cal.

595,793.—WATER PURIFIER—H. Stillman, Sacramento, Cal.

595,750.—INSECT EXTERMINATOR—C. Zimmerman, Santa Rosa, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FUSE CUTTING TOOLS.—Ernest A. Langford, Washington, Cal. No. 595,915. Dated Dec. 21, 1897.

This invention relates to a tool which is especially adapted to preparing fuse to be used in conjunction with mines and at other points where explosions are to be produced by such mines. It consists in the combination in a single structure of jaws movable to and from each other by means of handles and having openings respectively for severing the fuse into lengths, for crimping and securing it to the cap through which the explosion is eventually produced, and in cutting the end of the fuse to expose the powder core, so that it will be sure of ignition.

Colorado's Gold Fields. Illustrated.

Just out, with correct map and nearly 100 mining views natural as life. This valuable book will be sent free, prepaid, with our big 56-col. family paper 3 months on trial for 25c; club of 5 and 5 books $1. Latest mining news. Mention THE PRESS and address *Illustrated Weekly Sentinel*. Denver, Colo. Cripple Creek is fully described.



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Recently Declared Mining Dividends.

Horn Silver M. Co., Utah, 5 cents per share; Dec. 31. This makes total dividends paid $5,150,000.

Whitewater mine, Kaslo, B. C., $30,000; Dec. 21; total, $124,000.

Ontario, Utah, 75 cents a share, $112,500; Jan. 1; total to date, $13,557,500.

Moon-Anchor G. M. Co., Colo, 2½ cents, $15,000; Jan. 1.

Boston & Colorado Smelting Co., a quarterly dividend of 1½%, a reduction from 2½%; payable Jan. 1. The company has for the past twenty-five years maintained a quarterly dividend of 2½% until the present quarter.

Chloride Point, Utah, $5000; Dec. 28.

Silver King, Utah, $37,500; Dec. 25; the thirty-sixth monthly dividend; total, $1,500,000.

Iowa M. Co., Colorado, ⅓ cent per share, $5000; Dec. 25.

Utah Con. M. Co., Utah, 1 cent per share, $1000; Dec. 29.

Recent California Mining Incorporations.

The Yukon & Northwestern D. & T. Co., San Francisco; capital stock $100,000, subscribed $3200; H. Zadig, A. J. McDowell, E. R. Bryant, J. J. McCarthy, R. F. Brodek, G. Haist, R. C. Reed.

The California G. M. Co., Stockton; capital stock $100,000, subscribed $5; R. B. Oullahan, W. C. Pyfer, K. C. Brueck, R. B. Tufy, H. E. Adams.

Trinity County M. Co., Oakland. Capital stock, $1,000,000; subscribed $50. R. M. Turner, W. W. Davis, G. A. Stevens, J. W. Laymance, D. Fite.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from B. Freecero, in the Frazer and Swank Gravel mine at Washington Ranch, Calaveras Co., to deposit tailings in an old pit; from Manuel Silva and Joseph Enos, in the Cherokee Flat mine at Cherokee, Butte Co., to deposit tailings on a flat below the mine; from J. Lagomasino, in the Grizzly Bear Placer mine near Johnsville, Plumas Co., to deposit tailings in Squirrel creek; from Paul Zerga et als., in the Last Chance Placer mine near Sierra City, Sierra Co., to deposit tailings on a flat below the mine; from T. T. Kirkham, in the Mt. Vernon mine near Nevada City, Nevada Co., to deposit tailings in Mt. Vernon ravine; from William Ross, in the Clark mine near Oleta, Amador Co., to deposit tailings in Deadman's creek; from Chas. E. Wise, in the White Oak mine near Colfax, Placer Co., to deposit tailings in Live Oak ravine; from John Solari and Joe Devenenzi, in the Red Gulch and Mahala Flat Hill mines near Volcano, Amador Co., to deposit tailings in a ravine below the mines; from J. F. and M. H. Goodman, in the Bicknell mine near Volcano, Amador Co., to deposit tailings in the North Branch of Sutter creek; and from S. R. Hackley, in the Indiana and Gold Bug mine near Omo Ranch, El Dorado Co., to deposit tailings in Perry's creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 17, 1898, at 1:30 p. m.

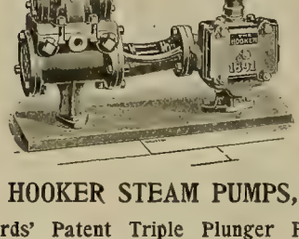


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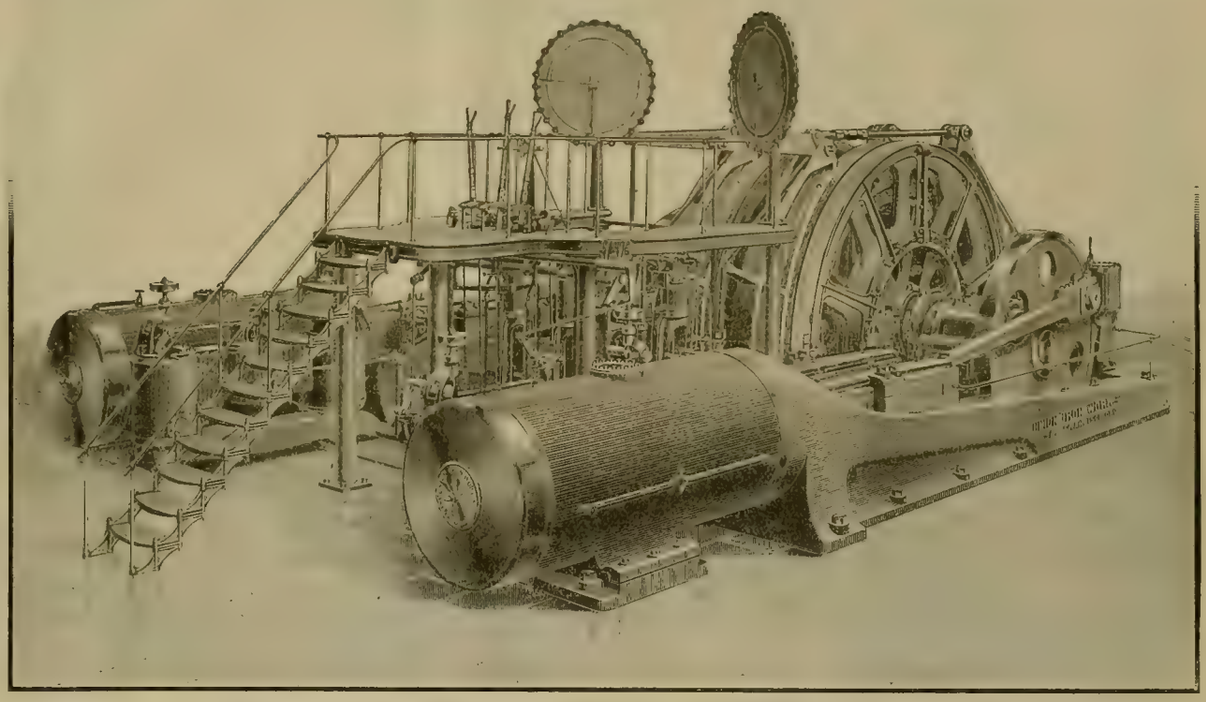
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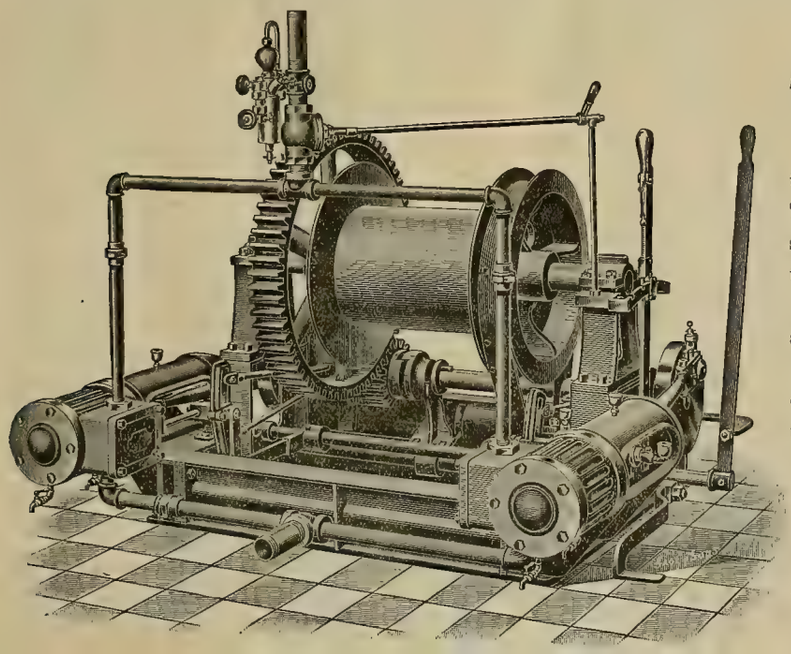
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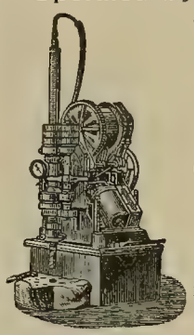
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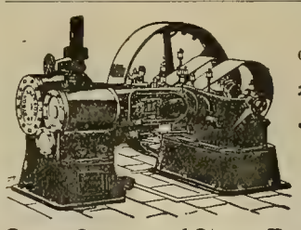
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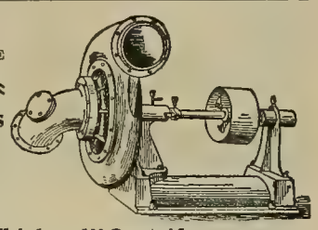


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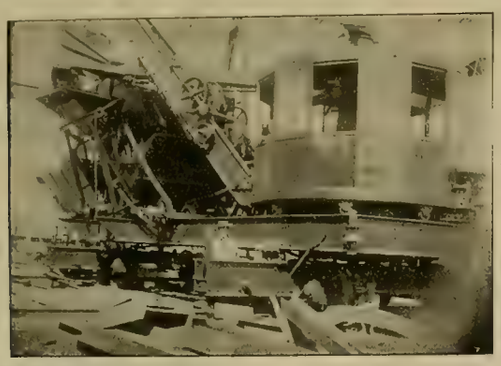
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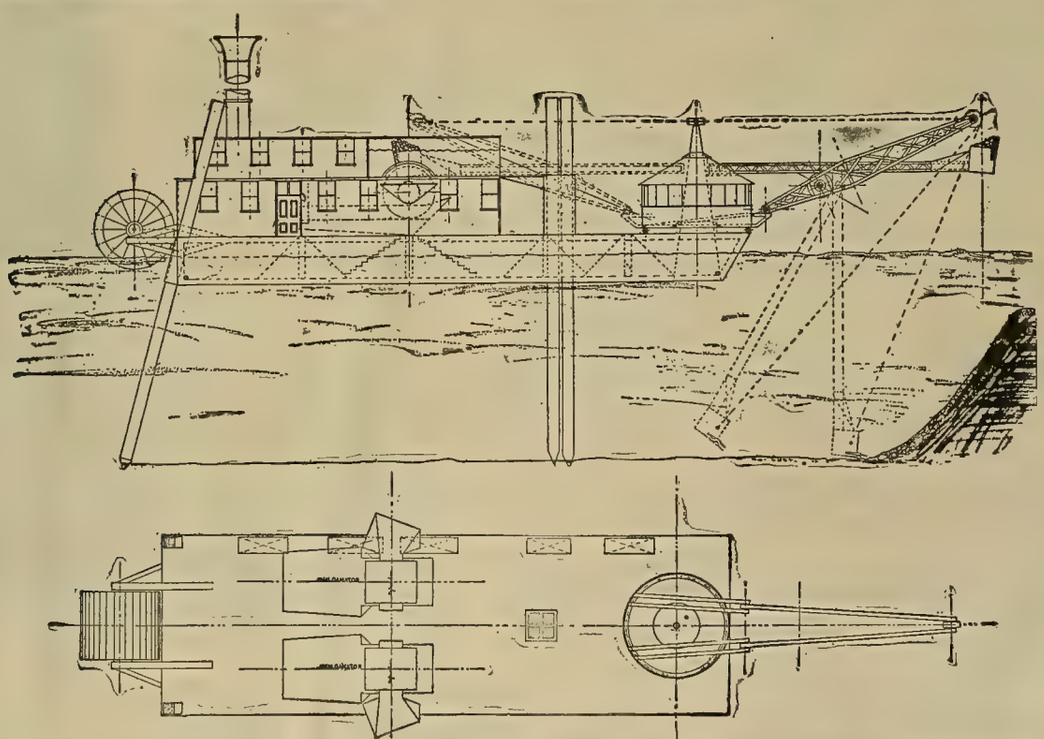
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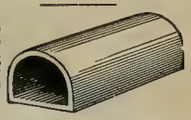
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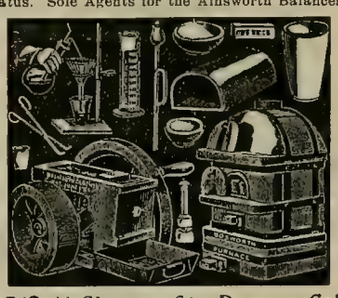


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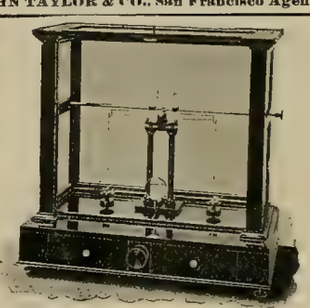
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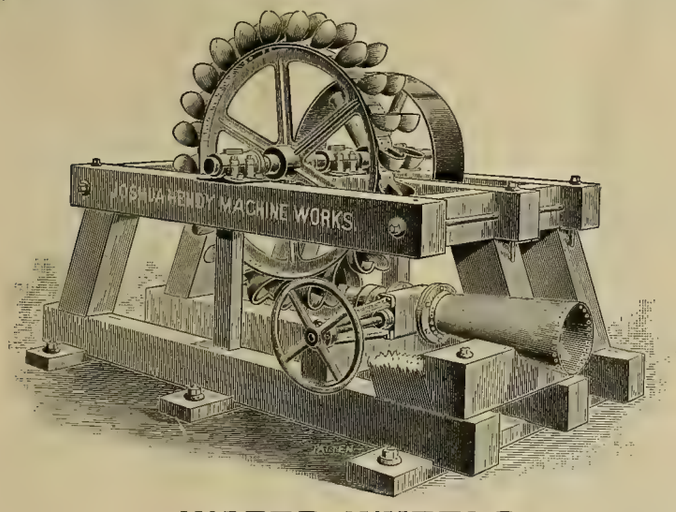
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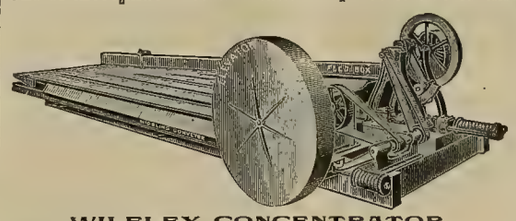
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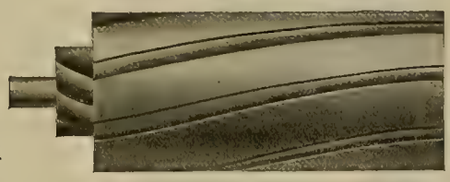
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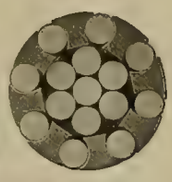
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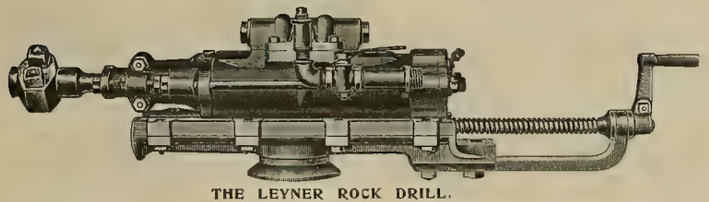
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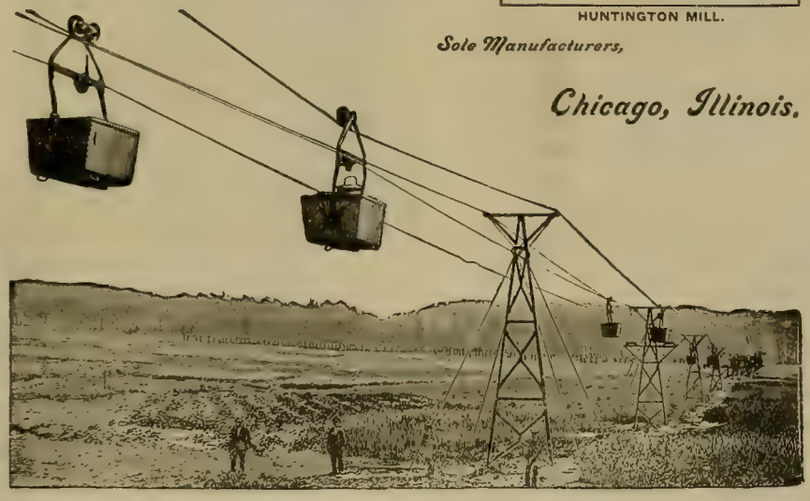
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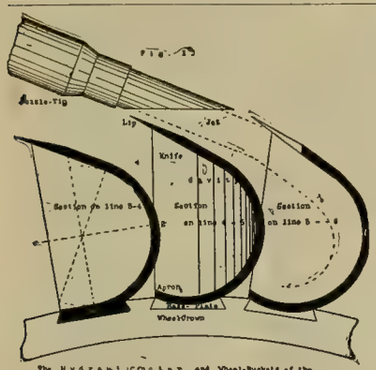
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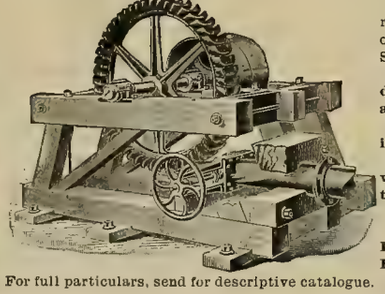
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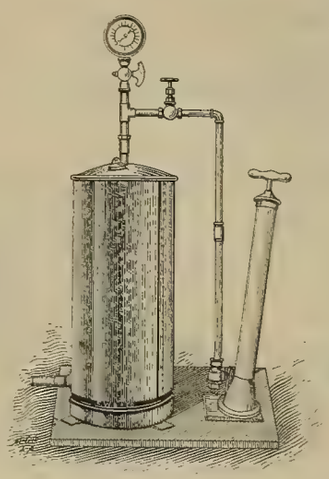
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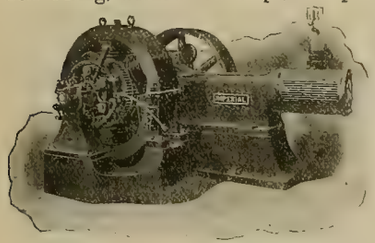
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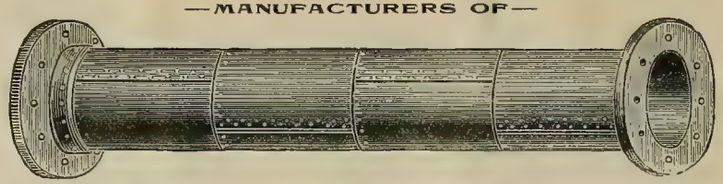
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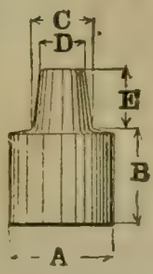
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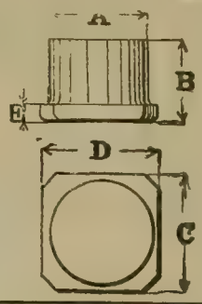
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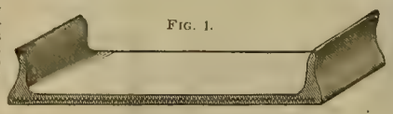


FIG. 1.

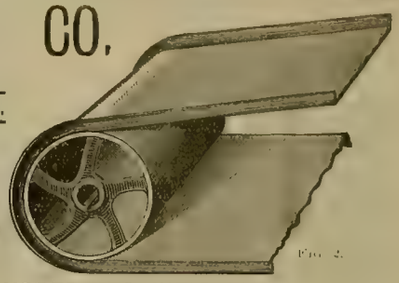
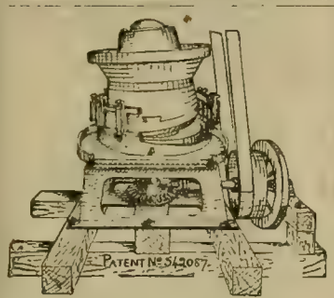


FIG. 2.

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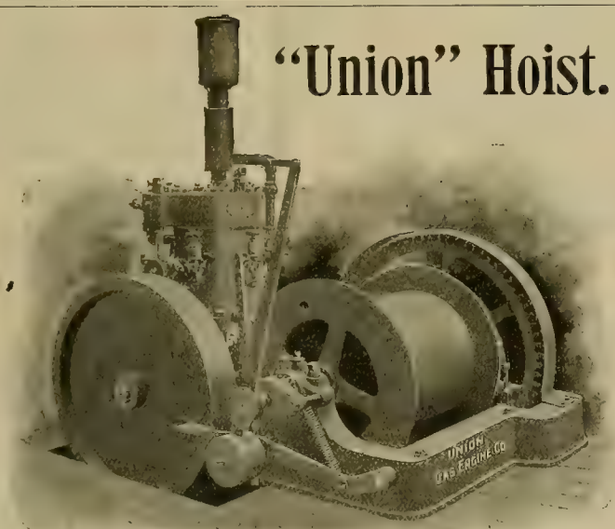
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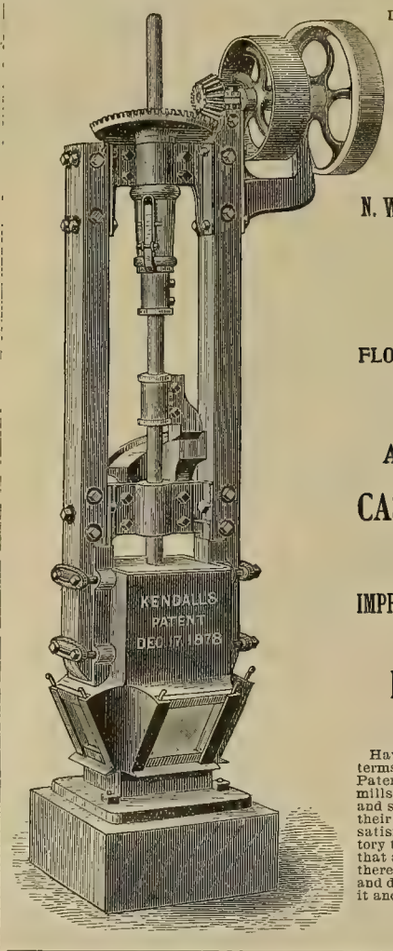
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Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

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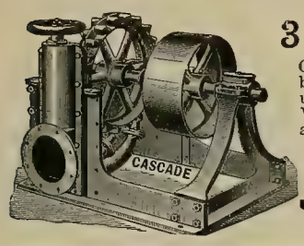
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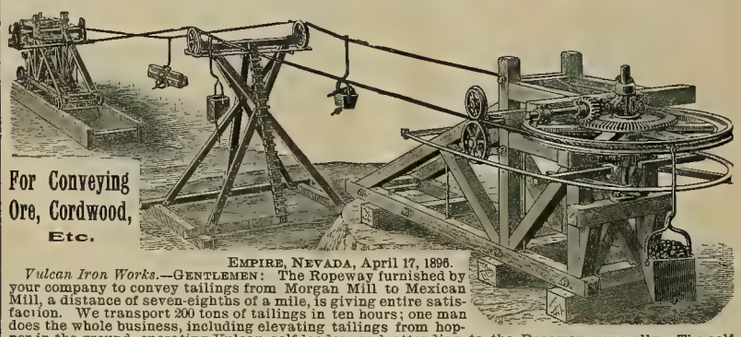
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Yours very truly, J. P. WOODBURY, Supt.

VULCAN IRON WORKS,

MANUFACTURERS OF MINING MACHINERY,
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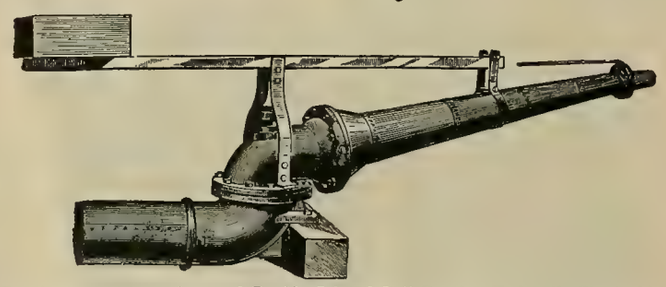
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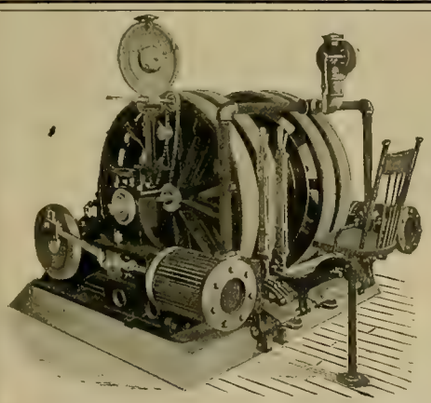
It is of the double rope pattern and the newest and best thing in its line ever placed on the market. The automatic features, simplicity of construction, ease of running and economy in operation places the



Finlayson Tramway

far ahead of all other systems of aerial ropeways. It is unsurpassed in tonnage capacity. It is on the principle of "You push the button and the machine does the rest." If interested send for special catalogue.

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10 x 12 LIGHTNING QUADRUPLE FRICTION HOIST.

Whatever is popular deserves attention.—*Thackeray.*

Unquestionably the Most Popular Friction Hoist in the Market is the

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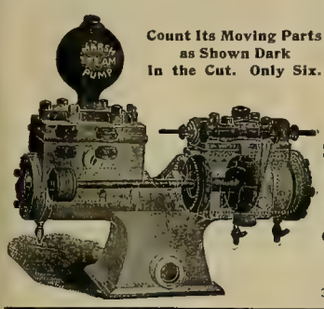
Requires less power to apply and gives better contact for friction surfaces than the double friction types. By carrying the brake band between the frictions the strain is reduced to a minimum.

COMPLETE HOISTING OUTFITS CARRIED IN STOCK.

HENDRIE & BOLTHOFF M'F'G CO.,

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MARSH STEAM PUMP.



Count Its Moving Parts as Shown Dark In the Cut. Only Six.

ABSOLUTE ACTUATION AND REGULATION.
PATENT SELF-GOVERNING STEAM VALVE.
PATENT EASY-SEATING WATER VALVE.
NO OUTSIDE VALVE GEAR.

Maximum of Strength, Simplicity and Service.
Minimum of Weight, Wear and Waste.

Simonds Saws. Dodge Wood Split Pulleys.

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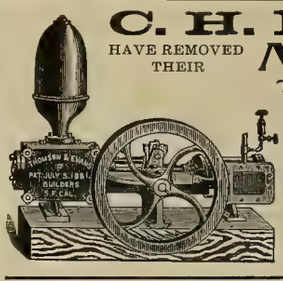
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Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of



Thomson & Evans Steam Pumps,

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SHEET IRON & STEEL PIPE

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Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

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Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with State Law.

FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco.

Market Reports.

The Markets.

SAN FRANCISCO, Dec. 30, 1897.

Considering that this is the closing week of the year, general business is good. From all that can be learned preparations are being made by jobbers and manufacturers for a very large increase in their business the coming spring and summer, due to a large rush of people to Alaska. The number of persons that will go there next year is placed at from 100,000 to 200,000. The railroads and other transportation companies in this country are doing all they can to help it along, as are the transatlantic steamship companies, for the craze in Europe is as bad as it is here. It is given out by reputable mining men that the tributaries of the Mackenzie river that drain the east side of the mountains are as rich in gold as any found on this side. If this shall be proven correct by prospectors going there, then the year 1898 will witness another rush to that section. The Alaska boom will cause more attention to be given gold mining properties in California and neighboring States.

The local money market is quiet and easy. The impression prevails that there will not be much change in the situation until towards the close of January, when a speculative investment demand is expected to set in. It is estimated that the disbursements in this city next month will aggregate more than in the corresponding month of 1897; the amount is placed at over $6,000,000. This will help quite materially in meeting any demand that may spring up. The disbursements at the East, particularly at New York, will be larger than ever before. It is worthy of mention that large sums of money from this country have sought investment abroad, owing to the rate of interest there being better than in the United States. This condition shows that we have grown to be a large money lender, and in the course of time, probably before five years, we will control the finances of the world. The East reports that a fairly firm market ruled up to this week; when it became easier, owing to the United States disbursing money. The disbursement to be made in New York next month is placed by the *Wall Street Journal* at over $100,000,000, which will cause an easy money market there and bring about more speculation.

New York Silver Prices.

NEW YORK, Dec. 30. — Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	26⅜	57⅝
Saturday		
Monday	26¾	57½
Tuesday	26⅝	57
Wednesday	26½	56¾
Thursday	26⅝	57⅛

	Copper.	Lead.	Iron.	Tin.
Fri.	10 87½@11 00	3 72½	10 00@12 25	13 65
Sat.			@	
Mon.	10 85 @10 95	3 72½	10 00@12 25	13 65
Tue.	10 85 @10 95	3 72½	10 00@12 25	13 65
Wed.	10 85 @10 95	3 72½	10 00@12 25	13 67½
Thur.	10 90 @11 00	3 72½	10 00@12 25	13 67½

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.82¾
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	57⅜
Mexican Dollars nominal	47@—

SILVER.—The market fluctuated to slightly lower prices but to-day it rallied some, closing firm at New York and London. The market is very sensitive to any demand and this being the case still firmer prices ought to rule, for there will be an improved demand from India and Argentina for crop moving purposes. The Central American States ought to take more for coffee harvesting purposes. A late cable from London states that the Indian money markets were firm and considerable money will go forward to that country. The last steamer for China took out $36,070 in silver bullion for Hongkong and $70,000 for Bombay.

MEXICAN DOLLARS.—The market is fairly firm. The last steamer for Hongkong took out $241,006 in Mexican dollars.

COPPER.—The market has held to fairly steady figures. The continued strike in England is being felt in the market value of copper. New York advices state that the export demand is light, as is the home consumption, which tends to create an easy market.

Our market is quoted as follows:

Ingot casting, jobbing	13 @—
Ingot " wholesale	12¼@—
Sheet copper	—@16½
Bolt ¼ and 5-16, 20c; ⅜ and larger, 16½	

TIN.—The market is quiet for both plate and pig. The East reports quiet markets with some cutting.

The market is quoted in jobbing lots as follows:

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, "	4 00@—

SHOT.—The market is steady.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 40
Drop, B and larger sizes, " "	1 65
Buck, Balls and Chilled, do, " "	1 65

POWDER.—The market is firm at current quotations.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9 to 11c, according to strength and quantity.

QUICKSILVER.—The market is quiet but steady. The last steamer for Mexico did not take out any. The East reports firm markets.

Our market is quoted at $39 for domestic consumption and $35@36 for export to the west coast of Mexico.

LEAD.—The market is quiet but fairly steady. Reports come through of large sales in the central West, but they did not affect values.

Our market is quoted in jobbing lots as follows per 100 pounds:

Pig	4 75 @ 5 00
Sheet	6 30 @ 6 80
Pipe	5 60 @ 6 10

IRON.—The market is quiet. Imports of foreign the past week aggregated nearly 200 tons. The East reports free offerings of Southern, which cause an easy market there.

NAILS.—The market is firm.

We quote the following basis: 20d to 60d, inclusive—wire $2.60, cut $2.50.

COAL.—The market is practically unchanged. The cold weather causes a heavy consumption.

Receipts of Coal for the week ending Tuesday were as follows in tons. Puget Sound, 8949; Japan, 2700; Nanaimo, 2139; Newcastle, N. S. W., 3500; Coos Bay, 1375; Hull, 1738; Comox, 6550; Swansea, 2887. Total, 29,633.

COKE.—The market is quiet. Imports were quite free the past week, as follows in tons: London, 504; Shields, 373; Hull, 532; Newcastle, England, 1721; Dundee, 2700. Total, 5830.

The market is quoted as follows:

Gas Companies'	— @ —
English, to load	— @ —
" spot, in bulk	11 00 @ —
" in sacks	12 00 @ —
Cumberland	10 00 @ —

PLATINUM.—The market is steady.

Our market is quoted in a jobbing way at $15 per ounce and for scrap $10 an ounce.

BORAX.—The market is firm with a good demand ruling.

The market is quoted as follows:

Refined, in carload lots, in barrels	6
Refined, in carload lots in sacks	5¾
Powdered, in car lots	5¼
Concentrated, "	5½

ZINC.—The market is firm.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 45 to 50 cents per pound for ingots.

ANTIMONY.—The market is steady.

Chemicals.

The market is quiet but fairly firm. It is expected that better prices will rule soon for some kinds. New York reports Nitrate of Soda firmer owing to a better concentration; outside of this the market was unchanged.

CYANIDE OF POTASSIUM.—The market is steady.

Our market is quoted for chemical pure 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The demand is quiet.

We quote in a jobbing way at 1¾c per lb for 66%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported firm from store at 6¾@7c per pound in carboys.

BONEASH.—There is a slow demand.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady, with better inquiry.

We quote in a jobbing way at 4c per pound.

SPELTER.—The market is steady.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is firmer.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steadier at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA. — The market is quiet, with a steadier tone.

Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

Mining Share Market.

SAN FRANCISCO, Dec. 30, 1897.

The market has been very dull throughout the week, with sales of only 300 shares recorded at one of the regular calls. This is accepted as direct evidence that the public is not doing anything and that the manipulator is willing to let the market drift along for the present at least. Although the market has been inactive, prices have stiffened slightly. This, in the natural order of things, they should, for many are selling very considerably below assessments paid this year. From all we can learn, the mill owners on the Comstock, and also the owners of the railroad and other enterprises in that district, have tired of the small output of ore, as the properties owned do not pay, and will insist on the mines being more energetically worked for the purpose of discovering one or more large bodies of ore. If this information is correct—and it has every semblance of being so—then we can reasonably look forward to more active exploiting than for several years, and as the history of Comstock mining shows that a strike of a large body of ore has been made when least expected, it is quite safe to affirm that history is more than liable to repeat itself under energetic exploiting. To do this will require increased expenditures of money, calling for assessments; but shareholders pay these cheerfully when there is a chance of striking ore. It is not at all unreasonable to assert that while work is under way the mining share market will be subjected to many ups and downs. It will also be spotted—that is, one or more shares move up and then ease off, while one or two others move up. This will invite more active trading and allow the nimble trader to make a little by getting out on ups and in on downs. This has been the case when more active work is under way in the Comstock mines, and it will be again, but it is to be hoped that it will not end, as it has for several years, in a complete fizzle. At present prices the market is a gamble.

In the Bodie district the outlook is promising for more activity next year, with an increase in the bullion output looked for.

The news from the Comstock mines is confined almost entirely to official letters, and as usual some of them are unsatisfactory to outsiders who are not miners. The west crosscrift in Utah was at last advices in soft porphyry showing clay seams. In Sierra Nevada they are making good progress in the Riley tunnel. They average about 8 feet a day. The east crossdrift on the Layton tunnel level passed through low-grade quartz. Fair progress is being made in west crossdrift No. 5 on the 900-foot level of the Union shaft workings. Work in Union is confined to east crossdrift from the south drift above the 900-foot level. The east crossdrift on the 1000-foot level in Mexican is in more favorable formation. It is in over 550 feet. If they keep on the west crossdrift in Ophir on the 1000-foot level will reach the gold-bearing lode to the west. They are in about 725 feet. At last advices the face was in seams of clay and vein matter. On the Central tunnel level they have struck 50-cent ore, which will lead to a 25-cent assessment down here. The work in Con. Virginia is continued on the 1550-foot, 1650-foot and 1750-foot levels. Nothing of special interest is reported in the official letter. They are still drifting north in Andes on the 175-foot level. Nothing of special interest comes to hand from Best & Belcher and Gould & Curry. The Kinkead milling plant has suspended work owing to labor troubles. This stops the milling of ore from the latter mine, also prospective working of dumps of Ophir and other mines. They are making fair progress in the west crossdrift of the 500-foot level of Savage. They are also preparing for active work on the 130-foot level. In Chollar they ought to be through soon with repair work. In Potosi the work is the same as reported last week. They are repairing and retimbering the Crœsus shaft in Bullion. This is west and in years gone by proved quite rich. They still continue timekilling in Alpha on the 500-foot level. There is still a strong flow of water in the Challenge-Con. Imperial-Confidence west crossdrift. It is in nearly 1700 feet. The Con. Imperial surface tunnel is in about 500 feet. It is in old fillings. From Yellow Jacket nothing more is at hand than was reported last week. According to official letters the work in both Crown Point and Belcher is being pushed with more energy. It is largely of an exploiting character and in the direction to find the extent and value of the ore found some time ago. In Overman they are repairing and enlarging the main incline. Some ore is being raised from the 900-foot level. The news from Justice is quite encouraging. The management believe that the work is proving to be a valuable proposition. The work is of an exploiting development character.

Renewed interest is being centered on the Brunswick lode. The work to the west in the Best & Belcher and Gould & Curry, run jointly by these two, is causing the shares to exhibit more strength. They are still drifting north on the 600-foot level of Savage. In Chollar work is confined to the 300-foot, 500-foot and 600-foot levels. Nothing new is reported. In Potosi work is continued jointly with Chollar to the west on the 500-foot level, and in an upraise on the 600-foot level. From Occidental our advices report active exploiting work, but with no particular change to note on the 550-foot, 650-foot and 750-foot levels.

The following illustrates the changes of the week:

MINES.	Dec. 16.	Dec. 30.
Alpha		
Alta Consolidated	$ 03	$ 05
Andes		
Belcher	51	
Best & Belcher	48	
Bodie		
Bullion	06	
Challenge		
Chollar	37	36
Confidence		
Consolidated California and Virginia	1 25	1 30
Consolidated New York		
Crown Point		
Exchequer		
Gould & Curry		43
Hale & Norcross	1 25	1 65
Justice		
Mexican		
Ophir		65
Overman	05	
Potosi	40	41
Savage		
Sierra Nevada	51	72
Union	23	
Utah		
Yellow Jacket		

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	58	10c	Dec 3.	Jan 7. Jan 28	J E Jacobus, 309 Montgomery
Belcher S M Co, Nev	57	20c	Nov 20.	Dec 24. Jan 14	C L Perkins, Mills Building
Bullion M Co, Nev	51	5c	Dec 17.	Jan 21. Feb 12	R R Grayson, 331 Pine
Challenge Con M Co, Nev	24	10c	Dec 16.	Jan 19. Feb 9	C L McCoy, Mills Building
Crown Point G & S M Co, Nev	72	20c	Nov 10.	Dec 15. Jan 5	Jas Newlands, Mills Building
Hale & Norcross S M Co, Nev	11	10c	Mar 20.	Dec 28. Jan 18	R R Grayson, 331 Pine
Marguerite G M & M Co, Cal	8	10c	Nov 4.	Dec 13. Jan 15	F Mettmann, 237 Twelfth
N Gould & C rry G & S Co, Nev	19	10c	Nov 13.	Dec 17. Jan 3	E W Sichel, 337 Pine
Occidental Con M Co, Nev	29	10c	Dec 7.	Jan 11. Feb 1	A K Durbrow, 309 Montgomery
Overman S M Co, Nev	78	5c	Nov 17.	Dec 22. Jan 12	G D Edwards, 414 California
Red Cap M Co, Cal	2	$5	Nov 29.	Jan 6. Jan 29	H H Martin, 125 Beale
Union Con S M Co, Nev	55	15c	Dec 6.	Jan 11. Jan 31	A P Swain, 309 Montgomery
Utah Con S M Co, Nev	26	5c	Dec 2.	Jan 6. Jan 24	A W Havens, 309 Montgomery

San Francisco Stock Board Sales.

SAN FRANCISCO, Dec. 30, 1897.

9:30 A. M. SESSION.

100 Alta	05	250 H. & N	1 65
350 Gould & Curry	42	350 Yellow Jacket	42

SECOND SESSION—2:30 P. M.

200 Ophir	65	500 H. & N	1 60
400 Mexican	33	500 Yellow Jacket	43
500 Gould & Curry	43	600 Belcher	46
300 Best & Belcher	56	500 Sierra Nevada	72
100 Con Cal & Va	1 30	500 Overman	14
100 Chollar	38	100 Standard	1 60
100 Potosi	41		

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59-61 FIRST STREET,.....SAN FRANCISCO.

Rainfall and Temperature.

The following data for the week ending 5 A. M., December 29, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Minimum Temperature for the Week.	Maximum Temperature for the Week.
Eureka	.05	15 37	20 54	16 05	36	60
Red Bluff	00	6 66	11 11	10 03	26	64
Sacramento	00	4 38	6 10	7 14	56	28
San Francisco	T	4 07	10 25	8 58	30	60
Fresno	00	1 99	3 90	3 67	28	60
San Luis Obispo	00	1 58	7 00	*	24	78
Los Angeles	00	2 52	5 09	5 92	36	86
San Diego	00	1 41	4 25	3 09	36	78
Yuma	00	0 85	1 98	1 66	30	74

Assessment Notices.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Red Cap Creek, Humboldt County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 29th day of November, 1897, an assessment (No. 2) of Five Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 125 Beale street, city and county of San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1898, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 29th day of January, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. H. MARTIN, Secretary.

Office—125 Beale street, city and county of San Francisco, California.

ALTA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Gold Hill, Gold Hill Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of December, 1897, an assessment (No. 58) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of January, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of January, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. E. JACOBUS, Secretary.

Office—Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of December, 1897, an assessment (No. 29) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of January, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary

Office—Room 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

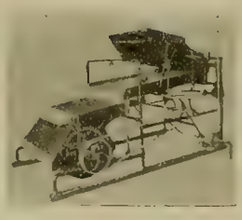
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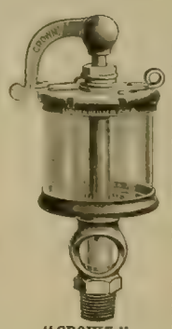
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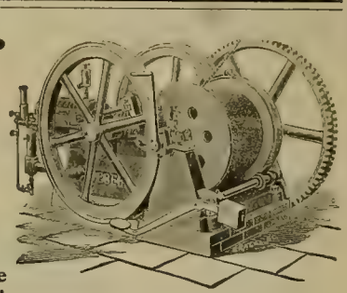
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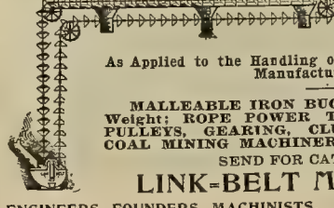
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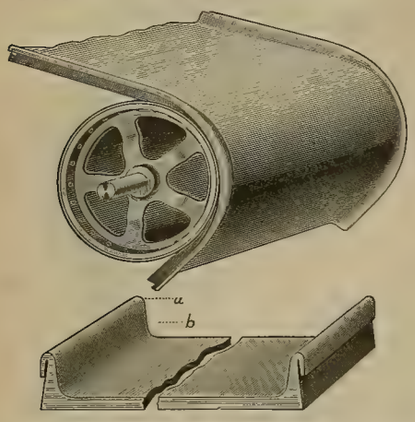
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It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

ORIGINAL EMPIRE MILL & MINING COMPANY,
GRASS VALLEY, NEVADA CO., CAL., Feb. 20, 1897.

JAS. S. BROWNELL, ESQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

ROANOKE MINING COMPANY,
MOKELUMNE HILL, March 4, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: We have in our 20-stamp mill at this place five Frue vanners; three of these are equipped with the Patent Lip flange belt and two with the plain flange belt. We certainly consider the former a great improvement on the latter. They will certainly wear much longer, as cracking now seems out of the question. Any one purchasing the Frue vanning machine should see that it is equipped with the Patent Lip flange belt. Very truly yours, ROANOKE MINING COMPANY.
Per G. M. WILDE, Acting Superintendent.

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JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.
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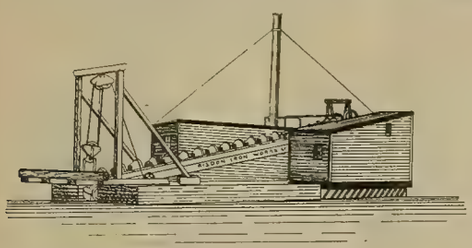
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Gold Dredging Machinery

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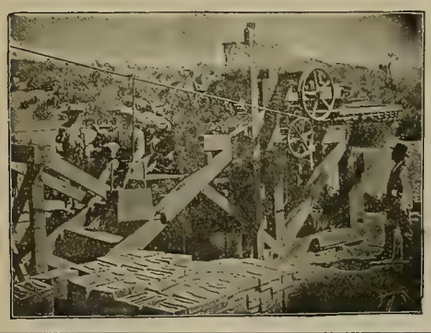
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FOR ROASTING, CHLORINATING AND DESULPHURIZING ORES.

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January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.
"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

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Catalogue on Application.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

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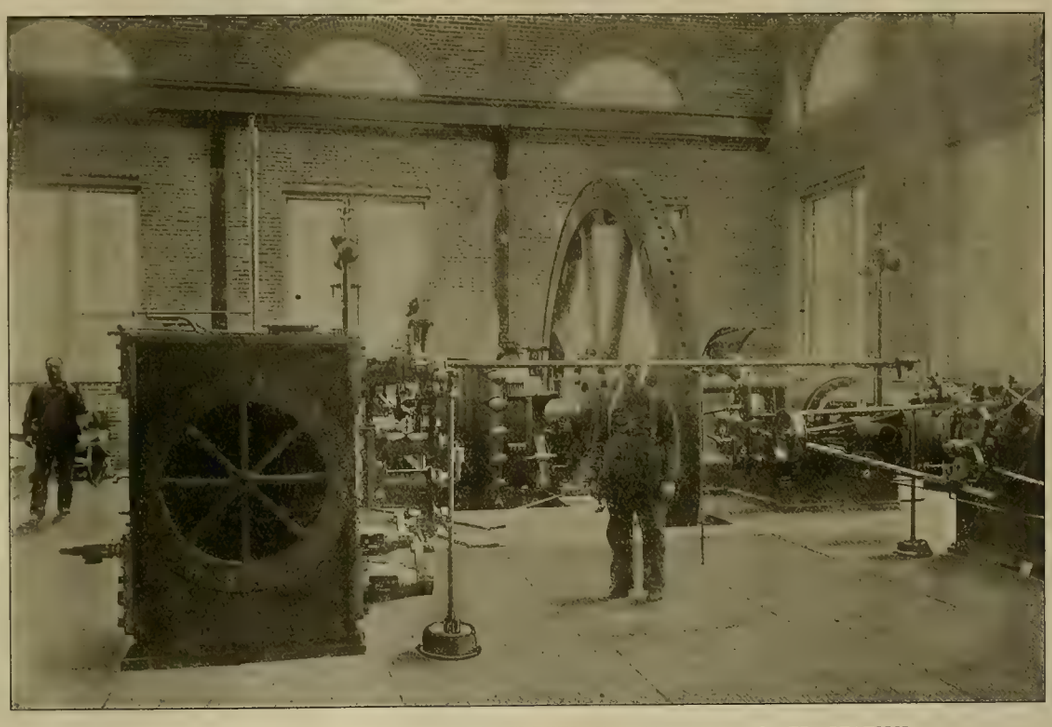
Suburban Railway Power Plant.

Throughout the entire extent of the Pacific coast the details of successful working of city and suburban railway power plants are of interest. Herewith is illustrated the engine room of an electric railway power station of a suburban service that is probably unequaled in the world. The regular running rate on this road—the Lorain & Cleveland, Ohio—is fifty miles an hour. The road is built along the lake shore, through a level country.

The power house is located midway between Lorain and Cleveland, on the bank of the lake. The intake is placed 1200 feet out in the lake and the supply is brought to a cold well adjacent.

Two batteries of boilers are installed, aggregating 300 H. P., and a space is left for adding 900 H. P. when the service requires it.

The illustration was taken soon after the road began operating and before the installation of machinery was complete. It shows the two cross-compound Corliss engines. The necessary gauges, the hand wheels that control the main steam valves and other fittings were not then in place. The cylinders are 20x36x48 inches and speed eighty revolutions per minute. The flywheels are 20 feet in diameter and weigh thirty tons each. The steam piping is carried under the floor, iron plate fittings being put in for accessibility between cylinders. This does away with what is often a great inconvenience in the use of traveling cranes, and improves the appearance. It is rendered possible by the location of the boilers 22 feet below.



ENGINE ROOM OF THE LORAIN & CLEVELAND RAILWAY POWER STATION.

The engines are provided with double eccentrics on the high and low pressure cylinders. Each has two governors. One operates the release valve and the other cuts off the steam, when the speed of the engine increases 10 or 12 per cent by releasing a weight which operates a butterfly valve in the steam pipe, and which also throws a circuit breaker in the main generator circuit.

Each of the engines is directly connected to a 400 K.W. generator, wound for 630 volts at no load and 700 volts at full load. The switchboard is located in the side of the building in the background, considerably to the left.

Beside the present engine plant is a reserved space for the installation of more engines when they are needed. The present plant is capable of carrying an overload of 10 per cent in excess of the rated capacity. The steam piping is arranged so that the engines may be run either condensing or non-condensing, with either or both cylinders taking steam direct, the steam supplying the low pressure cylinder passing through a reducing valve.

An Important Ruling.

The Secretary of the Interior has reversed a ruling of the Helena, Montana, land office in a case of some general interest.

In February, 1896, H. Elling applied for a patent to his mining claim. During the period of publication the Lillian Mining Company filed a protest against the issuance of a patent. Subsequently defendant made a motion to the Helena land office to dismiss the adverse. The land office declined, on the ground that the adverse, having been filed, could not be dismissed until the question of the ownership of the ground had been settled in the court, in accordance with the custom always followed in such cases. Elling appealed from this ruling to the Commissioner of the General Land Office, but the latter affirmed the decision of the Helena office.

Appeal was then had to Secretary Bliss, and his decision reverses both lower decisions. His ruling is viewed as a reversal also of previous department rulings in such cases. He says: "The department has heretofore held that a co-owner objecting to the issue of a patent must protect his rights under the form of procedure provided for an adverse claimant; but it is now insisted that this rule of the department has been reversed by the Supreme Court in Turner vs. Sawyer. This was an action brought by Sawyer, a co-owner, against Turner et al. to have Turner declared a trustee of Sawyer of an interest in the Wallace lode, which had been patented to Turner. The interest of Sawyer grew out of proceedings somewhat similar to those in the case at bar so far as action was had under section 2324."

In concluding the opinion the Secretary says:

"It is clearly apparent that the court has here announced a doctrine that is the reverse of that heretofore held by the department. The ruling of the court is binding upon and must become the ruling of the department. It follows, therefore, that the protest in question is not such a one as can be recognized as an adverse claim necessitating the institution of proceedings thereon, in a court of competent jurisdiction. It is the duty of the land department, excepting in controversies referred to the court by the statute, to determine before the issue of a patent whether the applicant is entitled thereto, and the fact that such controversies may be litigated in the courts after the issuance of patent does not relieve the department of its duty in the premises. Where the matter has already been decided by a court of competent jurisdiction, the question may arise whether such a decision is conclusive upon the department, but without deciding the question, it seems clear that where the dispute does not involve the character of the land, or the qualifications of the entry man, or his compliance with the law under which title is sought, the department may properly accept and follow the judgment of a court of competent jurisdiction determining as between contending parties their respective rights and interests in the land in controversy. The department is not required to await the bringing of suit, because it is not so provided in the statute and because there is no obligation upon either party to invoke the jurisdiction of a court, as there is in the instance of an adverse claim. Here suit has been instituted in the local court for the purpose of settling the question of joint ownership. Jurisdiction of the subject matter may exist even though not recognized by Sections 2325 and 2326. The land department may, therefore, well await the result of that suit before giving consideration to the protest."

THE great increase in the production of aluminum in this country by a cheaper process and the consequent reduction in price resulted in '97 in the receipt of orders by the principal manufacturers for large amounts from foreign nations for equipment of their armies, the contracts aggregating fifty tons a month.

THERE will be two great "rushes" in '98, that of individual adventurers to the Klondike and of European nations to partition China. Both will be of industrial benefit to this coast.

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J. F. HALLORAN.....General Manager

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WELLS, FARGO & Co. compute the gold production of Utah for 1897 at $1,609,340.

NEW YORK CITY lead quotations in March, '77, were 6.75 cents per pound; in August, '96, 2.65.

THE Spokane, Wash., stock exchange has petitioned for privilege to disincorporate because of lack of business.

THE 1850 product of the New Almaden, Cal., quicksilver mines was 7723 flasks of 76½ lbs. each, the 1865 product was 47,194 flasks. To Jan. 1st, '97, the mine has a record of production of 957,221 flasks. To that date California quicksilver mines produced an aggregate of 1,743,785 flasks.

THE transfer of the Zantgraf mine in El Dorado Co., Cal., by E. W. and T. B. Chapman to Col. J. L. and D. H. Cole is among the transactions of the last few days in mining deals. Possession was given on the 3d inst. The price is $200,000 cash. The clean-up for December at the Zantgraf mine was $20,000.

BY an unfortunate omission purchasers of the issue of the 25th ult. at the news stands were not supplied with the map which went with that edition. Additional copies have been provided, and those who were not supplied can secure one from the newsdealer who furnished them the issue of Dec. 25th.

WITH '98 comes news of interest to southeastern California and southwestern Nevada that the California & Eastern road is to be extended from Manvel to Good Springs—a distance of forty-five miles. The extension will traverse a country rich in low-grade ore that can be profitably handled only by cheaper transportation.

THE Mountain Copper Mining Co., Keswick, Cal., which recently bought the New Jersey Metal Refining Works, Elizabeth, N. J., is now credited with a production of 750,000 pounds per month. It is estimated that there exist 1,000,000 tons of ore, carrying 75% copper, and, to the ton, three ounces silver and 85 cents gold.

A PARTY of eighty-five miners from the Klondike this week say when they left there was no danger of starvation there, because of the wholesale exodus from Dawson down the Yukon to Fort Yukon, where provisions were more abundant. Nothing has been heard this year from Secretary of War Alger, or his ice locomotives or reindeer.

IT is in order to state as a matter of authentic record that the date of the discovery of gold by Marshall was Jan. 19th, and not Jan. 24th, 1848. The latter date has been extensively announced, but the fact as herein stated is absolutely correct. The fiftieth anniversary of the discovery of gold in California by J. W. Marshall will be Jan. 19th, 1898. It is a matter of little consequence in one sense whether it was the 19th or the 24th and the Golden Jubilee parade can, with great propriety, be held on that latter date, but to be chronologically exact it is to be borne in mind that the event which was the most important thing that occurred in the lives of a million men and all connected with them or their descendants occurred Jan. 19th, 1848.

'97 WITNESSED considerable advance in California electrical enterprises; and if the latest proposed extension to the circuit of the San Joaquin Electric Company's service goes into practical effect, that California concern will have what is probably the longest distance transmission and the highest electric pressure in the world. It is locally reported that a contract has been signed to extend the present circuit (which runs from the power-house on the north fork of the San Joaquin river to Fresno) to Hanford, thirty-two miles farther, a total distance of sixty-seven miles. The potential at the power-house is to be increased from 11,300 volts to 19,450 volts. It is understood that the extension is to be completed from Fresno through Selma and Fowler by April 10th, '98.

THE announcement that the issue of this paper of the 29th inst. would be a golden jubilee edition has elicited considerable inquiry as to the proposed scope and character of that number. In general, it will be historical and reminiscent, dealing with facts in the early history of gold discovery in this State, the idea being that it shall be a standard authority for reference during the next fifty years regarding authentic statement of fact. It will contain fifty-two pages. Those who are not regular subscribers should order in advance from their nearest newsdealers, as the pages will not be stereotyped, and after publication the matter will be distributed. The issue, it is believed, will be interesting to every resident of California, or to anyone who ever heard of the Golden State.

BUTTE, MONTANA, PAPERS say that there are 2000 idle miners in that place. This is not due to any decrease in force, but owing to the good wages paid there. Idle men from all over seek Butte, where there is little hope of securing employment, as the mines are showing a preference for the older and more experienced miners. The *Miner* looks for great relief in that region in the spring, when there will be "a great exodus to Alaska—far greater than one who has not been studying the situation would imagine. Strange to say, in most instances it is the experienced miner who is figuring on going to Klondike. The love of adventure never dies in the real miner; and there are hundreds of men, probably a thousand in Butte, who will give up positions paying good wages to chance the frigid zone."

IN the famous Tyler–Last Chance litigation Judge Beatty last week rendered a decision adverse to the Tyler Co. In his summing up the judge, as have other jurists before him, on the question of extra lateral rights, referred to the absurdity of the law, and said: "The statute gives the right to follow 'ledges throughout their entire depth,' which is the most valuable right under the mining law granted to the miner, and one which a court would not attempt to wrest from him. When it is held that this right is to be exercised by following between the planes of those lines which the ledge crosses, it should result that it may be following indefinitely in such direction. It is true that under such a rule it may sometimes occur that a party would follow nearly the course of his ledge, which seems rather absurd, but if the law cannot be so construed that a ledge must be followed on its true dip, but only as stated, we must accept the absurdity. It is now held that the defendant may follow its ledge westward of its end line."

IN connection with the Golden Jubilee Mining Fair, which will be a center of attraction to Californians and the coast generally throughout February and part of March, it is well to bear in mind that there will be a great Transmississippi exposition held at Omaha, Nebraska, next summer, and that the west half of America proposes to well represent there its mineral resources; that other States are preparing State mineral exhibits, and that it is in order to have California properly represented therein. It is not likely that the State will appropriate any money for that purpose, though other States have; but it is none too soon to suggest that much of that which will be exhibited during the six weeks beginning January 29th at the Mechanics' Pavilion in San Francisco could with great propriety be transferred to Omaha next summer. This is a matter that every man who possesses a mine of gold, silver, lead, antimony, iron, quicksilver, or any other useful metal in this State, is personally interested in, and it is none too soon to give the matter personal attention.

THE Golden Cache fiasco is an unfortunate affair for British Columbia. So much had been said about the riches of that mine, and so much money had been spent on it, that it is a keen disappointment to all concerned to know that in the recent clean-up 745 tons went $3.10 per ton, which, under British Columbia mining conditions, foreshadow for it the probable reorganization of the property. The stock, which was quoted at $1.85, has suffered considerable depreciation; and some men who have put their money into it are out several hundred thousand dollars.

THE recent Mariposa county correspondence in these columns, showing the good returns from the Merced Gold Mining Company, must be a great satisfaction to Boston people; for this paper is assured on credible authority that in case final success crowned the efforts of that company, many millions of Boston capital would be poured into California. This gratifying fact is somewhat shaded by the unkind insinuation from the Hub, that some of those connected with the company in question are not wholly satisfied at the publicity given the recent clean-up. Indeed, intimation has been made rather broadly concerning a plan of freezing out certain stockholders said to have been contemplated. Of course, when the stockholders know what splendid returns have been realized, they will naturally inquire as to the necessity for any assessment or borrowing of money, and such alleged scheme thus frustrated.

IN last week's issue was briefly noticed a London statement that the British-American Corporation, a London concern capitalized for £1,500,000, had bought some British Columbia mines, and incidentally the business of the Alaska Commercial Co. of this city, which Leon Sloss of that company in the same issue denied, saying that they had had an offer, but that there was no sale. In the London financial papers to hand appear page advertisements of the scheme, in which it is distinctly stated that they have guaranteed £500,000 of the capital and have secured options on the properties they describe. Among the properties so described are the Le Roi mine, the Josie, the Nelson-Poorman, and half a dozen others, the assets and good-will of the Alaska Commmercial Company, the stores of the company in Alaska, their property, including claims in the Klondike district, etc. They made the second payment of $35,000 to the officers of the Josie Mining Co. at Rossland, B. C., on the 31st ult.

DURING '97 the total gold coinage at the San Francisco mint aggregated $33,522,500, of which $29,405,000 was in 20-dollar pieces, $2,347,500 in eagles and $1,770,000 in half eagles. The total silver coinage for the same period was $6,561,791.65. No authentic figures have yet been received regarding the gold output of California for '97. For a variety of reasons accurate returns should be made, that correct statement may be made. Some mining companies do not realize the importance of this matter. As a case in point is mentioned a paragraph in a letter from one of our county correspondents this week, in which, speaking of the gold yield of his county, he says, "I fear that when the figures for the gold output of this county for '97 are made up we may get the worst of it, as the —— Mining Co. (mentioning the biggest gold producing property in the county) have sent their bullion outside, apparently for the purpose of leaving no trail as to their real output." While, of course, every one has a right to do as he likes with his own, yet, such action as that indicated is too common in California, and without being of any corresponding benefit individually, does the State an injury. It is to the interest of the com-

monwealth of California that every dollar's worth of gold annually produced within its borders be known and properly credited.

ACCORDING to a Washington dispatch, the Director of the Mint has substantial evidence that the world's product of gold for the calendar year of 1897 will approximate, if not exceed, $240,000,000, an increase of nearly 20 per cent over 1896. The gold product of the United States for 1896 was $53,100,000; for 1897 it will approximate $61,500,000. The product of Africa for 1896 was $44,400,000; returns received up to December 1, 1897, indicate that the gold product of that country for the year will be $58,000,000. Australia, for 1896, $45,200,000; for 1897 the indications are that it will be $51,000,000. Mexico, for 1896, $8,330,000; for 1897, estimated at $10,000,000. The Dominion of Canada, for 1896, $2,800,000; estimated for 1897, $7,500,000. India's product for 1897 is estimated at $1,500,000. Russia's gold product for 1896 was $21,550,000; for 1897, estimated to approximate $25,000,000. With the exception of the South Appalachian range, the Director believes that statistics will show an increase of every producing State in the gold product over that of 1896.

J. B. REINSTEIN, J. H. Budd and W. C. Jones, the trustees appointed by Mrs. Phœbe Hearst for the obtainment of an architectural plan of the buildings and grounds for the University of California, have completed their programme for an international competition, open to the architects of the world, a copy of which has been received. Copies of the programme for distribution will be forwarded to the capitals of all foreign countries and to the principal cities of the United States. The competition will close on July 1, '98, when all plans must be deposited with the United States Consul at Antwerp, Belgium. A total sum of at least $20,000 will be devoted to premiums for the best plans. The sum of $50,000 has been deposited in a San Francisco bank as a guarantee that the trustees will keep all their promised agreements. The programme gives full details of the competition, with rules, places of deposit, of plans, etc. The competition is open to the world and closes July 1st, '98. As heretofore noted at length, the regents have been enabled through the munificence of recent gifts to enter upon the work of erecting several groups of buildings that in construction, extent and appearance shall be commensurate with the fine site of the University.

THE sale of the steamers Pennsylvania, Ohio, Indiana, Illinois and Conemaugh by the International Navigation Company to the States Steamship Company for the Pacific trade leaves five steamships flying the American flag crossing the Atlantic ocean. They are the St. Paul, gross tons, 11,629.21; St. Louis, gross tons, 11,629.21; New York, gross tons, 10,802.61; Paris, gross tons, 10,794.86; Evelyn, gross tons, 1963.44. The latter three were built in English shipyards and denationalized. The last annual report of Commissioner of Navigation Chamberlain states that 6599 steam vessels, of 2,358,577.59 tons gross register, were afloat flying the American flag, and that 3776 of them, with a gross registered tonnage of 1,206,247.41 were owned on the Atlantic and Pacific coasts, the balance being owned on the Northern lakes and Western rivers. Such figures are misleading. As a matter of fact there are only 186 seagoing steamships, over 1000 tons gross register, amounting to 478,300.38 tons, flying the American flag. The Hamburg-American line and North German Lloyds of Germany alone own 552,558.00 gross tons, or 74,258.00 tons more than all American companies put together. Following is a summary of the class of vessels mentioned flying the American flag:

	No.	*Gross tons.*
Steamers from Atlantic ports to foreign ports..	38	124,876 31
Steamers from Pacific ports to foreign ports....	22	59,708.81
Steamers from Atlantic ports coastwise.....	98	235,239.42
Steamers from Pacific ports coastwise.....	28	58,475.84
Grand total.....	186	478,300.38

SOME notice was given last week of the "Great Northern Industrial Gold Company, Limited." It is unfortunate for California, so far as British investments are concerned, that such companies are formed and such prospectuses issued. The prospectus of a mine, whether in California or elsewhere, when prepared in London, is a delightful romance, and this particular one is no exception. It is appearing as a page advertisement in every English newspaper that is feared, and its glittering statements will doubtless have weight with a certain class. The two local gentlemen mentioned in connection with it are said to know nothing about it. The property, which is in Plumas county, this State, has been pretty well developed and is of some value, consisting of eleven claims well known locally—being the Ohio Point, Dude, Brooks, Buyers, Joe, Hallsted, Rich Gulch, Scheiser Ravine, Patton, Lewis and Summit quartz mines. A little of what is so, mixed with a great deal of what is not so, not specifically stated, but cleverly intimated, makes this one of the most seductive schemes put on the London market for some years. It is unfortunate for California that British promoters and brokers make such attempts as the one herein noticed. It is bad for this State, inasmuch as it tends to give a black eye to legitimate and worthy propositions. A great deal has been editorially said in these columns recently regarding British investments in California mines, much of which applies to this particular latest case. The worst feature of the whole thing is, that when this scheme fails—as fail of course it will—the odium will be upon California; when, as a matter of fact, California has as much to do with it as Tasmania—California's only connection with the whole thing being the fact that it happens to be within California's borders that the property which is the subject of such present meretricious mention is situated, and regarding which such a fanciful prospectus has been issued.

REGARDING Sacramento river improvement, effort is being made to secure sufficient county appropriation to send a delegate to Washington to "lobby," which of all ways of spending money is the most useless in such a case as the one in question. What is required is not lobbying at the seat of national government, but arraignment of the State officials who are acting in defiance of the mandate of the law that makes possible their official existence. Col. Suter has made public his plans for the improvement of the Sacramento river below Sacramento. He says to give seven or eight feet of water below the capital there should be employed both dredging and a system of wing dams and jetties. The points at which the improvements must be made are Iron Horse shoals, at the head and foot of Ida island, near Clarksburg; Heacock shoals, and opposite and below Sacramento. There is, the engineers say, abnormal width of the river at these points, and the construction of works of piling and brush held in place by rocks would be almost sufficient to give the required depth of water. The plan advocated is to place parallel rows of piling, between which there shall be masses of brush and rocks. Above these jetties there should be wing dams of brush. These works are contemplated to be supplemented by dredging at points where the natural work of the waters will not scour out a channel. He estimates that the natural length of the works, including wing dams, will be 18,650 lineal feet, at $14 a foot, which would put the cost at $261,000. The dredging contemplated would add to this $18,750, or a total expense of $280,000. The report also says the surveys above Sacramento and on the Feather river have not been completed. In the House of Representatives yesterday Congressman de Vries introduced a bill appropriating $500,000 for dredging and otherwise improving the Sacramento river and its tributaries. The object of this bill, he says, is to carry out Col. Suter's recommendation for the improvement of the Sacramento river, as outlined above.

No better opportunity for advertising ever presented itself to the mining counties of California than the Golden Jubilee Mining Fair, which opens at Mechanics' Pavilion in this city January 29th and closes March 6. It will be well worth while for every county board of supervisors in the thirty-seven gold producing counties of the State to each appropriate $1000 or $2000 for appropriate representation therein. The supervisors of Nevada county have appropriated the latter sum for appropriate display of that county's mineral resources. The fiftieth anniversary of the discovery of gold in California is being made the occasion of a week of jubilee in the city, at the close of which begins a mining exposition of extraordinary interest. It is in order for every mining county in this State to appropriately represent its mining resources. Several counties have already realized this, but others have not, and it is not too late even yet to take proper interest in this important matter. All county exhibits will be shown on the main floor, and space is now about taken up. The operating machinery will be in Machinery Hall; all exhibits in that department must be in place and operation before the 28th inst. The machinery exhibits will be one of the completest things of the kind ever seen, including the newest, up-to-date mining machinery in every department of gold mining. The scenic effects will be fine and the entire exhibition will be an object lesson in gold mining. The exhibition will be well worth attending, and should be seen by every miner in the State or elsewhere who can make it possible to be present. A unique feature of the exposition will be the Klondike department, and any intending emigrant to that far-off region who sees it will realize that San Francisco is the place for him to get his outfit. The committees in charge are all working together, and the result will be an exhibit well worth seeing.

H. W. C. JACKSON of Rossland, B. C., back from a three months' visit to London, England, his native city, declares that "the methods of the London promoters would be considered outrageous in the United States. Outside of the few strong syndicates, such as the Rothschilds, who never appeal to the public to help them finance any of their new flotations, the London promoters are a most greedy and unscrupulous set. The propositions which they will make to the people bringing over good properties there are almost beyond belief. I learned of several cases in which options had been given on mines to reputed wealthy syndicates, who were supposed to have the money all ready to pay over, but for some reason or another required the vendor to visit London to close up the sale. When the mine owner got there he was coolly informed that the English company was organized and the directors named, and all that remained to be done was for the vendor to pay the registration fees of the English company and underwrite the new concern so that the English public could be given a chance to invest in it. They had not done a thing but organize a paper company; had not put and did not intend to put a dollar of their own into it, and expected the vendor to put up all the preliminary expenses. If the flotation was a success they would make £200,000 or £300,000 out of it and risk nothing. The pressure of money looking for investment in England is enormous, and that gives these fellows their opportunity. Though the investor has been robbed in a shameless way by the company promoter, he seems to be afraid to entrust his investments to others. It might also be said that the latter constitute a close corporation in London, largely through their control of the financial press, which is corrupt beyond belief. There is one paper in London, however, which retains the confidence of the investing public, and rightly so—the *Standard*. Its financial editor, Mr. Wilson, however, has one failing, from the investor's point of view. He almost never recommends a new flotation. As for the London *Times*, for some years past they have pursued a policy of masterly neutrality. Each new flotation is noticed in a brief paragraph, giving the names of the directors, capitalization, etc., but never under any circumstances expressing an opinion as to whether the proposition is good, bad or indifferent. This was not always their policy. That paper, in its time, has exposed some very bad swindles, but the proprietors found this work very unprofitable. In most cases they were sued for libel, with the result that they were out considerably over £100,000 for legal expenses."

ANTIMONY smelters draw their chief supplies from foreign sources. In '96 but two mines in this region, one in California and one in Montana, yielded any, the aggregate being thirty-three tons, worth $1,380. In '97 Idaho produced some. Antimony occurs in three localities in California, but the present price, 8½c, does not warrant production. In '96 the United States imported 2,576,371 lbs. crude and regulus, and 1,180,828 lbs. ore, of a total value of $180,377.

Some Considerations About Roads.

Much has been published herein on the value and necessity to the mining counties of good roads. In the last three years in the counties of Calaveras, Amador and Tuolumne over $1,000,000, direct loss has resulted from the bad condition of the roads at certain seasons. It is noticed that in the last mentioned county the local authorities realize the business requirements, and that this week contracts have been made for building two highways from Jamestown to Sonora and Stent. They will be four miles long each, and will be built with a rock base and a top dressing of gravel.

In this regard it is of interest to note that at a recent meeting at Petaluma, Sonoma Co., Cal., a paper on road making was read by N. S. Frost, a civil engineer. It was an excellent paper throughout, but some statements and illustrations were especially striking. Herewith is reproduced some of them.

Direction of Roads.—The first consideration in road making is the direction. The road should run in a direct line between the initial and the terminal points. Though this principle would seem to be self-evident we frequently see it violated, particularly in the Western States, where the favorite system is to have the roads run on the section lines regardless of topography, convenience or anything else. And yet in nine cases out of ten this is the very worst system that could be adopted. Topography does not run according to section lines, nor do railroads, and these are the guiding features in the location of towns, and yet in laying out a system of roads to connect these towns, it is thought necessary that all the roads should point straight to the north pole, as if every wagon was a relief expedition and loaded with grub for the frozen-in-whalers. I had some experience of the beauties of this system in San Joaquin county. The railroad, which, of course, governs the location of the towns, runs nearly northeast, while the roads follow the section lines, so it was necessary to travel twenty miles south and west to reach a point only fifteen miles distant.

Circumstances, however, alter cases, and while in geometry the straight line is the shortest distance between two points the rule does not always follow in road making. A straight road in a hilly country is a bad road, because either the grades would be very steep, or it would cost a great deal of money to reduce them. The road should wind around the hills instead of climbing over them, but this simple principle is too often disregarded. Roads are carried over short spurs that they might just as well go around, and in many cases the distance would be but little, if any greater. Suppose the half of a watermelon or pumpkin is lying on the ground. It is evident that a straddle bug meeting with this obstruction in his travels, would have no farther to go in passing around it, than if he climbed over it, and it would be a good deal easier. Five hundred feet of elevation is equal to a mile or more on a common road, and considerably more than a mile and a half on a good macadamized one. And this brings us to the proposition that the better the road the greater the evil of grades. For instance, on a railroad, where the resistance is about eight pounds to the ton, or 1-280, a grade of about four inches to the hundred feet will double the resistance and consequently the power required, while on a common road where the resistance is seldom less than 1-20, it would require a grade of five feet to the hundred to double the resistance. On a good macadamized road two feet per hundred would have the same effect. This, however, is no argument against improving the surface of a mountain road.

Importance of Grades.—In establishing a new road there are always some points through which it must pass, say certain low passes in the hills. Between these points the road should follow the grade contour line so that the grade from one ruling point to the other shall be uniform, the uniform grade being always the minimum. In a long ascent it is allowable to introduce level or nearly level stretches, especially at the bends, but there should be no descent on the down grade, as that would necessitate climbing two or more hills instead of one. Two villages with unpronounceable Indian names, in the State of New York, located twenty miles apart, on an equally unpronounceable creek, have a difference of elevation between them of 800 feet. The most level common road between them rose more than 1200 feet in going up the creek and more than 400 feet in going down. The line of a new plank road laid out by a competent engineer rises only the necessary 800 feet on the ascent and has no up-grade at all in the other direction, thus saving one-third of the height in one direction and all of it in the other. Gillespie, in his work on road making, speaks of a road in England where Telford saved 1283 feet of perpendicular height and more than two miles in distance between two points twenty-four miles apart.

Drainage of Roads.—The improvement of our present roads, however, is a more important question at present than the laying out of new ones. The surface should be hard and smooth, free from dust in summer and mud in winter. How is this to be accomplished? The first and most important requisite is thorough drainage. The water must be kept off the roadway, for while drainage alone will often convert a very bad road into a passably good one, no possible amount of labor or expense will make even a tolerably good road until the water is gotten rid of. The roadbed should be well crowned, and provided with capacious ditches on each side, and these ditches should be kept clear of grass, brush and rubbish; the water should have free acess to the ditches from the road, and from the ditches to the natural watercourse.

The Surface.—The surface of the roads should be hard, smooth and non-elastic. A surface of India rubber might be very pleasant to drive over, but it would be killing on the team. As to the importance of smoothness, let us see what is the effect of a stone or rut. Suppose a wagon with its load, weighing one ton, meets a rock four inches high, what will be the power required to pull over it? Let the radius of the wheel be twenty-six inches; the load on it will be 500 pounds. Now, it is easy to calculate from the leverage, that it requires a force of a little more than 314 pounds to pull the wagon over this obstruction. If the road is a tolerably good one the tractive power required to draw the wagon over it will be about one-twentieth of the load or, in the present case 100 pounds. Thus it appears to draw one wheel over a rock four inches high requires more than three times the power that it required to draw the whole load over the rest of the road, but of course no one ever saw a four-inch rock on any of our Sonoma county roads. Take as large a sledge-hammer as you can swing and bring it down on the axle with a force of 170-foot pounds and you have the effect of dropping into a four-inch rut. I have known a four or five-inch chuckhole that could have been filled for 10 cents to cost the owner of the wagon more than $10, and that not very long ago nor very far from Petaluma. If the road is an earth road there should be no stones allowed upon it, as earth and rock can not wear equally and sooner or later stones will project above the surface, and about the worst thing that can be done with a rut is to fill it with stones, as that will soon make a ridge instead of a rut, and while ruts are great friends of the wheelwrights, ridges are by no means friendly to teams.

A great preventive of ruts is wide tires and sprinkling. The sprinkling is being provided for by the Supervisors of this county, and the taxpayers will soon find that the pumps and water wagons are as good an investment as could be made.

Rolling.—Whether the road is of earth, gravel or macadam, it should be rolled with a good heavy roller, a ten-ton steam roller being far the best, and the rolling continued as long as any settlement can be observed, filling all depressions as they appear, and, in case of a gravel or macadam road, the roadbed should be thoroughly rolled before the gravel or broken stone is placed on it. It should be borne in mind that the object of macadamizing is to provide a hard surface for the wheels and to keep the water from the surface of the roadbed. The roadbed has to carry the weight of the stone covering as well as that of the traffic over it, and it is useless to place the covering until the roadbed is prepared for it.

The Supervisors of Sonoma county have made a good beginning by providing pumps and sprinkling wagons. Now let them go a little further and provide one or more ten-ton steam rollers, portable rock breakers and road graders. Most of our roads contain enough rocks to go a long way towards macadamizing a tract from eight to sixteen feet wide, and there are quarries accessible to all. Let the rocks be removed from the roads, and passed through the breaker. The steam roller will furnish power both to transport and operate it, the roads properly graded, the broken rock replaced, and the whole thoroughly rolled. A few years of this, and Sonoma county roads will be a model for the State and will repay the cost over and over again.

A New Chlorination Process.

For gold ores which contain such a percentage of sulphurets as prevents the extraction of the gold either by amalgamation or by chemicals, unless the ore is subjected to an oxidizing roast before treatment, after roasting, chlorination has, since its introduction, been a favorite treatment. A full illustrated description of the latest in this line appeared in the issue of Dec. 18, '97. An additional discovery is reported by M. Etard, Professor of Chemistry at L'Ecole Central, Paris, and by Professor Black of the Otago, New Zealand, University. The two discoveries are protected by patents. This invention claims that its application does not require specially trained or skilled supervision. The original solution as prepared by M. Etard was composed of hydrochloric acid and permanganate of potash; the Black solution contains sulphuric acid, permanganate of potash, and salt. The latter preparation has the advantage of being cheaper in the British Colonies, where hydrochloric has a higher commercial value than sulphuric acid, while its solvent powers are equally as great and rapid. The solution can be applied by percolation or agitation. At a recent public trial the former system was adopted, and 92 per cent of the gold contents of a refractory ore, containing copper salts, extracted after twenty hours' contact. In a laboratory trial upon the same ore, a 92 per cent extraction was effected in five hours by agitation. The cost of the solution differs according to the nature and contents of the ore acted upon, and may be reckoned at $1 per ton of concentrates chlorinated. Theoretically the cost of the solution should vary according to the gold contents of the ore, but practically it varies in proportion to the other metallic contents. What actually takes place in the vats may be represented by the following equations:

ORIGINAL ETARD SOLUTION.

$$6KMnO_4 + 30HCl + 8Au = 8AuCl_3 + 6KCl + 15H_2O + 3Mn_2O_3.$$

BLACK'S MODIFICATION OF THE ETARD SYSTEM.

$$6KMnO_4 + 24NaCl + 15H_2SO_4 + 8Au = 8AuCl_3 + 12Na_2SO_4 + 3K_2SO_4 + 3Mn_2O_3 + 15H_2O.$$

It will thus be seen that theoretically 948 parts of permanganate of potash is required to dissolve 1568 parts of gold. In actual practice with the well-roasted Mount Morgan concentrates containing an undetermined quantity of copper, and working with test plants on a small scale, the consumption of permanganate is .2 lb. per ounce of gold dissolved, or two lbs. per ton of roasted ore treated. As permanganate is by far the most expensive of the ingredients, it is the consumption of this chemical which will determine the value of the invention.

Forests and Rainfall.

Prof. H. A. Hazen presented a paper at the last meeting of the American Forestry Association—a paper which will be read with interest by many Californians, for the relations between forests and rainfall have been a favorite theme of discussion in this State ever since the American occupation. Prof. Hazen begins by asking:

Can it be possible that the cutting away of forests affects the amount of precipitation in any locality? To many no doubt this question will seem easy of answer, but we find the results of study by no means reassuring, and recent investigations have led to almost diametrically opposite conclusions, depending, somewhat at least, upon the feeling of the writer. When we reflect that our rainstorms are of very wide extent, oftentimes over 1000 miles in diameter, and may take their origin and bring their moisture from distances of 1000 miles or more, the thought that man, by his puny efforts, may change their action, or modify it in any manner, seems ridiculous in the extreme.

It has been well established that forests have a most important bearing upon the conservation of rainfall; that the forest floor permits a seepage of water to the source of springs and thus maintains their steady flow; that they hold back the precipitation that falls, especially in the form of snow, thus preventing or ameliorating the effects of dangerous freshets. There is not the slightest doubt of their great importance to the welfare of man, but all these facts do not affect the question of their influence upon precipitation. The following paper is prepared from the standpoint of a meteorologist, and is an attempt to present facts:

The Historical Argument.—Formerly, the historica argument was a favorite one. I quote one of these "It is a familiar fact that there are many regions in Asia and southern Europe, once exceedingly fertile and densely populated, that are now utterly sterile and desolate. The country bordering on the Euphrates and portions of Turkey, Greece, Egypt, Italy and Spain are now incapable of cultivation from lack of rain due to deforestation." The most fertile of all provinces in Bucharia was that of Sogd. Said Malte Brun in 1826: "For eight days we may travel and not be out of one delicious garden." In 1876 another writer says of this same region: "Within thirty years this was one of the most fertile spots of central Asia, a country which, when well wooded and watered, was a terrestrial paradise. But within the last twenty-five years a mania of clearing has seized upon the people, and all the great forests have been cut away and the little that remained was ravaged by fire during a civil war. The consequences followed quickly and this country has been transformed into a kind of arid desert. The water courses are dried up and the irrigating canals are empty." It has also been said that in the older settled portions of New England and the Middle States there are arid hills and worn-out fields, due to the falling off of precipitation from the cutting away of the forest growth. Such quotations and statements might be made to fill a large volume. Without more precise data as to rainfall it would be hazardous to conclude that we have here a case of cause and effect. It is certain that the fertility of these regions in ancient times was due to stupendous irrigating devices and canals, and when these were neglected, through wars and other untoward circumstances, the fertility necessarily ceased. It is certain that there are ruins of enormous irrigating ditches and canals in Babylonia, where history indicates that there was once a teeming population

and great fertility, but where now only a sandy desert greets the eye.

Is the Forest a Cause or an Effect?—Some have said that where our densest forests are found there we have the greatest precipitation. There is no way whereby we can see that such forests would have started unless favored by rainfall, so that the presence of the forest rather indicated the earlier occurrence of practically the same rainfall as at present. Meteorologists are agreed that there has been practically no change in the climate of the world since the earliest mention of such climates. Plants found in mummy cases in Egypt that were plucked thousands of years ago show the same size as those now found in that land. The "early and the latter rains" are experienced in Palestine to-day just as they were four thousand years ago. Jordan "overflows all its banks" to-day in February precisely as it did in Joshua's day. When we come down to recent times, and to the records of rainfall measured in New England for more than one hundred years, or, at least, before and since the forests were cut, we find a constancy in the rainfall which shows its entire independence of man's efforts. Right here it should be noted that totally barren lands of any extent, in New England for example, are to be found only in imagination. Even where the forest has been cut away mercilessly there springs up a growth of sprouts which covers the ground and answers almost the same purpose in causing rainfall (if there is any effect of that kind) as the forest. Even where land is entirely cleared of a forest we have at times the green pasture, and at others still heavier crops which leave the ground anything but a sandy waste.

Rainfall Measurement in Forest and Open.—But the strongest argument adduced in the past to show the influence of forest on rainfall has existed in a comparison between rain-gauge measures in the forest and the open field. Such records have been made for more than thirty years in France and Germany and surely we must have here, if anywhere, a sufficient proof of a forest's influence.

Admitting that we have perfect instruments and careful observers, there still remains a most serious doubt as to the immediate environment of each gauge and as to the possibility of a direct comparison. It is probable that no two gauges 2000 feet apart can be placed so as to catch the same amount of rain, though to all appearances the exposure is faultless in each case. This is plainly seen on the roof of a building. For example, before the office of the Weather Bureau was removed to its present location in Washington, eighteen rain gauges were placed on the roof and one upon the sod not 500 feet away. There was only one of the gauges that gave the same rainfall in all storms as the one on the sod. Some of the others gave more in some storms and some less, but all of them in the total rainfall of eight months gave less than the one which compared exactly with the sod gauge. In an early publication of rainfall records in this country (not by the Weather Bureau, however) two stations are given—Marengo and Riley, in Illinois—not more than three miles apart, but yet differing by 19 inches in the total annual precipitation for several years. I have no doubt that in the latter instance one or both gauges were badly exposed; but enough has been said to show the extreme caution needed in studying such records and the absolute necessity that exists in obtaining a comparison between gauges that are not affected harmfully by their surroundings.

The French Investigations.—One of the best of all researches in this line has been conducted at Nancy, in France. Within a distance of five or six miles there have been four stations established—at Nancy in the open and at Belle-Fontaine in the forest and, 500 feet higher vertically, Amance (open) and Cinq-Tranchees (forest). The latter stations are in a more hilly region and cannot be compared together, as can the former. At the lower stations we have comparative observations for twenty-five years. I have summed these in three groups, containing eight, eight and nine years in each group. First group, Nancy (open), had 31.16 inches, while Belle-Fontaine (forest) had 32.46 inches; second group, 33.39 inches and 34.07 inches; third group, 30.05 inches and 29.89 inches. We see that, while the first eight years showed a very slight excess in the forest rainfall over that in the open field in the last nine years (including 1894, last published), the open station showed a little more rain than the forest station. These observations were made with particular care, for the purpose of exactly determining the influence, and may be relied on if the environments of the gauges were comparable. At Amance (open) and Cinq-Tranchees (forest) the observations have not been quite so regular, though we have twenty-five full years of records at these two stations, but not the same years as at the other stations. Amance shows 26.70 inches and Cinq-Tranchees (forest) 33.39 inches, or an apparent preponderance of 6.7 inches a year in the forest. This would make more than 20 per cent greater in the forest than in the open. It should be borne in mind, however, that these last two stations are on an eminence, and are not strictly comparable, and this result cannot vitiate that at the two other stations, which shows no effect.

German Observations.—In Germany we have a rather remarkable record of a slightly different character. Lintzel is a station on the Luneburg heath, which began to be planted with trees in 1887, at the rate of 1000 to 1500 acres a year, and in a few years over 8000 acres were covered. In the midst of this forest is the meteorologic station in an open field of some seventy-five acres. Before planting the forest 97 per cent of the surface was field, meadow, or heath, and afterward 80 per cent was forest and 20 per cent was roads, open field, and heath. Around this station, pretty evenly distributed, and within fifty miles, there are thirteen rainfall stations, which have been carefully established and presumably are comparable with the Lintzel station in the midst of the growing forest. There is no means of knowing whether any of these stations have been changed or not, but for our purpose we may consider the material homogenous and treat it accordingly. Records from 1882 to 1896 (fifteen years) are available. Charts were prepared for each year, showing the ratio between the Lintzel record and that at each station of the thirteen. There is no space for these charts, but, in place of them, I give here the mean of all the thirteen station ratios for each year: 1882, 81; 1883, 83; 1884, 101; 1885, 103; 1886, 82; 1887, 98; 1888, 93; 1889, 122; 1890, 97; 1891, 100; 1892, 90; 1893, 96; 1894, 142; 1895, 128; 1896, 136.

The Figures Not Significant.—These figures are extremely significant, and may be further elucidated as follows: The smaller ratios show a less rainfall at Lintzel as compared with surrounding stations. It is impossible to determine whether these trees have reached the culmination of their effect or not. In 1896 most of them would be seventeen years old, and the ground would probably be fairly covered. It is a great pity that the environment was changed or some accident happened at Lintzel so as to vitiate the three last years. (As inquiry was sent to Germany regarding the error, but no response has yet been received.) The record does not seem to show any appreciable effect upon the precipitation; in 1884 the ratio was 101, while in 1893, nine years later, it was 96. It is probable that no definite and unassailable result can ever be obtained either by the method adopted in France or this later one in Germany. The rainfall is so variable within a distance of even a mile or two, and it is so difficult, if not impossible, to obtain similar environments at all the stations, that no decisive result can be obtained. It will be seen readily that the multiplication of stations will do no good, and, above all, that the observation of rainfall under trees in a forest is absolutely useless for any such discussion or study as this.

It seems probable that if two or three lines of stations could be established a mile or two apart on four sides of an enormous forest, each line to have a dozen stations or so, about 3000 feet apart, four of the stations to be outside of the forest and the others each in a large, cleared space of at least two acres extent in the forest, something decisive might be obtained. It should be noted, however, that from the evidence already accumulated there would be very little to be gained by a further study of the question. It is certain that the effect, if there be one, is almost inappreciable. The favoring conditions over the forest are balanced by those not favoring and the integrated effect is practically the same in the two cases.

An Inappreciable Gain.—Prof. H. F. Blanford of India determined from a most careful series of records, from which all known errors had been eliminated, that the forest had a tendency to give 2 per cent more rain than contiguous open fields. That is, if an open place had 50 inches of rain in a year a near-by forest would have only 51 inches, which is practically inappreciable.

It would be an interesting study to select all those cases in experiments in forest and near-by fields in which the wind was blowing either from the forest to the field, or vice versa. It is evident that if there is any effect on rainfall by the forest, it would be vitiated if not exactly reversed by such winds.

There is a class of visual observations which seem to show an effect upon rainfall by the forest. Probably many have seen heavy clouds passing over a plain, but which only precipitated as they passed over a forest. Also in a hilly region it is a frequent phenomenon that fog and low-lying cloud hover near a forest, and not over an open plain. One also notes very often in passing into a forest on a damp day that the trees drip moisture, possibly condensed from moisture evaporated from the damp earth underneath. Observations of this nature, however, cannot ordinarily be checked by instrumental means, but show in a general way that the forest tends to conserve vapor and moisture which in the case of the open field would be diffused into the atmosphere.

THE age of a valley is a measure of its stage of development. It may be steep-sided and young; it may be half open or mature; it may be wide open or old. At any stage of its development it may be submerged and buried, and thus preserved until some future time when it is again revealed by weathering, like any other fossil. In this sense the valley, whether young or old, may be dated as geologically ancient or modern.

Notes on Present Western Practice of Metallurgy Economically Considered.

NUMBER III.—CONCLUDED.

By W. B. DEVEREUX.*

In custom smelting works the ore is almost all crushed to a very fine state for accurate sampling and for roasting, and the amount of flue dust becomes a very considerable item and one that cannot possibly be disregarded. All well equipped furnaces, therefore, are provided with dust chambers more or less extensive. These are of many and various types. Some are constructed of brick with hollow walls for cooling, with a total length of passages as much as a mile. Others are constructed of sheet iron with a V-shaped bottom, the whole structure being enclosed to prevent condensation of acid fumes by cooling. The bottom of the dust chambers is provided with openings, so that dust can be drawn off at intervals into a car which runs on a track under the chamber. Another class which is used with very satisfactory results makes the final separation of the fume by filtering through cloth. One type of apparatus for this purpose is a house filled with long bags through which smoke is forced by a ventilating fan. These bags are shaken from time to time, in order to keep the pores from being stopped with dust, and the dust is taken out at intervals from the bottom of the sacks. A later invention than this consists of houses in which are sheets of cotton cloth stretched in tent-shape from the top. The smoke is forced through these, and the tents are beaten at intervals with rods moved by a lever from the outside of the building, the dust falling to the floor. The disposal of the dust has been a very annoying problem. In some places it has been made into bricks with clay or with milk of lime either by hand or by machine. In other places it is immediately put into reverberatory furnaces and heated until it slags together. The fume from the bag houses, however, is combustible, and after a sufficient amount has accumulated on the floor of the house, it is set on fire by throwing live coals on the surface at intervals. Apertures are opened to admit air and a general combustion takes place, sintering the mass together and forming a product something like coke, which is in the very best possible condition for treatment in the furnace. It has also been found that dust collected in the chambers before the smoke reaches the bag house is combustible, and in some works this dust is simply piled in small houses with brick walls and set on fire. Air is admitted and combustion goes on until the whole mass is sintered together. Smelting has now become subject to such competition that there is an absolute necessity for saving all the values possible in the ore. Metallurgists who are working on ores from their own mines are too often careless about their losses, but it is just as reprehensible to lose values when you are working on your own ores, and with much larger margins for loss, as it is when you are working on custom ores where you are in competition with other skillful metallurgists.

I have used a method of blowing in lead furnaces, which I think has sufficient novelty to merit a description. It starts the furnace off in good condition, and with ordinary care gives very little trouble:

The crucible is heated with cordwood, and as soon as the walls are fairly hot a 2-inch pipe, bent at an angle, is inserted through the breast to the bottom of the wood fire and air is blown in. The crucible is filled with cordwood, and, as soon as it is blazing well, several bars of bullion are shoved in on a plank and tipped off on the wood. This bullion melts and runs down through the hot fire to the bottom, becoming red hot. This process is continued until the crucible is full of lead, when the fire is raked out and the lead thoroughly stirred up from the bottom and skimmed. The crucible and siphon are then full of red-hot lead, perfectly clean. Brands and wood are then put back on the lead to form a support for the coke and to kindle it; the breast is put in and the furnace filled with coke to about 18 inches above the tuyeres; then light slag charges and coke to the top of the jackets; then charges, part ore and slag, and finally normal ore charges to the top.

A light blast is turned on until the slag begins to show at the slag taps and it can then be raised gradually to normal pressure. In this way the fusion zone is kept from rising, and the furnace starts off with cool walls and a cool top. If lead makes too slowly and shows a tendency to cool in the well, a few bars can be dipped out and charged into the furnace again.

With this hasty survey, we must leave the subject of lead-silver ore smelting. You cannot fail to realize that neither methods or their limits are yet well defined.

The aim of the best metallurgists may be summed up in a few words:

1. The largest furnaces compatible with good work.
2. Slags which will permit the largest amount of refractory and hence profitable ingredients.
3. A perfect initial separation of slag, matte and bullion by automatic appliances, with mechanical handling of the slag.
4. Economical treatment of lead, copper mattes.

* Condensed from School of Mines Quarterly.

The Bettel Slimes Process.*

The study of the slimes question, which the originator made during his engagement on the Robinson mine, led to the erection of a small plant at the Primrose during 1894. The experience gained there emboldened Mr. Bettel to prophesy, at the opening of the Primrose plant, that zinc precipitation (the MacArthur-Forrest process), when combined with electrolytic action, would run the Siemens-Halske process very close. The reasons for this forecast were repeated on several occasions at the Chemical and Metallurgical Society's meetings—one was the conviction that chemically clean zinc precipitated the gold of an auro-cyanide solution which contained no free sodic or potassic cyanide. This assertion was received with incredulity, but the fact has been abundantly proved. It is on this fact (*i. e.*, that pure zinc as well as the electrolysis plays an important part in precipitation) Mr. Bettel's process, named the "electro-zinc process" is based, and it is to this fact that the really wonderful results, attained with even the present somewhat imperfect plant, are attributable.

The principal troubles experienced in the Primrose experiments were from insoluble anodes and from the difficulty of keeping the electricities separate by means of porous cells; short circuiting sometimes occurred and turned the zinc cathode into an anode. These difficulties (with others) had not been overcome in 1895, but it was clear that the germ of a good process was there. In March, 1896, the inventor was satisfied that most of the difficulties had been overcome, and a syndicate was formed to finance the process, which was being perfected during 1896. Early in this year it was on a working basis, and last May arrangements were made for its exploitation on a commercial scale on the site of the present plant.

In tracing the process through its consecutive stages, it is found that the slimes, as they leave the settling tanks of the sand plant, flow to brick and cement tanks with sloping bottoms; on the road to the tanks, at the head of the delivery launder and just after passing the automatic sampler, the addition of clear lime water takes place.

The clear, supernatant water in these settling tanks is discharged by peripheral overflow until the requisite amount of slimes is collected in the bottom. The water above the slimes is then removed by a decanting pipe of special construction, which does not work automatically, but gives excellent results, even in the hands of an unskilled native laborer. The concentrated slimes are then agitated with air combined with motion, and the homogeneous pulp is elevated thirty feet by means of four-inch centrifugal pumps.

On reaching the highest point in the works, solution of .01 KCy strength is added, and the slimes are allowed to run in company with the solution through at least 300 feet of launder. By this means thorough aeration is assured, as well as intimate mixture, and the gold is dissolved out of the slimes before they leave the launder. Solution of the gold by this means entails a substantial economy in the construction of treatment tanks. It may be noted that it is the inability to dissolve the gold locked up in the sands (which are now carried with the slimes) during the passage along the 300 feet of launder which tends to vitiate the results now being got.

The slimes and solution are then caught in one of two tanks (similar to the settlers described, with the exception of their not being provided with peripheral overflow), the charge of such a tank containing 145 tons of pulp, containing seventy tons of dry slimes, and 200 tons of solution. The charge occupies the tank for about twenty-four hours, including the time occupied by filling and discharging.

The liquor is decanted off by similar decanting pipes to those used in the settling tanks; and the residues, equal to 145 tons, are elevated afresh after agitation to the highest point of the works. Here 200 tons of weak solution (.005 KCy) are added, and the charge is run into the next settling treatment tank. After settling during a like period as before, and after decantation of the weak gold liquor, the residues are agitated and discharged into the residue dam. It is intended to collect any water obtainable from this residue dam and return it for the sake of the precipitation of the gold it contains.

The 200 tons of .005 solution is increased up to a strength of .01 KCy after its decantation from the slimes. The solution is returned to the head of the launder and thence serves as the first solution of the next charge of slimes. This solution (after having done work twice) is pumped into an upward filtration tank of special design, where any turbidity is removed.

The clear liquid is decanted off through a floating syphon of special construction, and is delivered into an equalizing tank of three compartments, which, by means of a differential ball-cock arrangement, allows of the discharge into the extractor boxes under an even head.

The extractor box forms one of the special features of the plant. Those in use at the Comet are 30 feet long by 6 feet wide by 3 feet 6 inches deep, divided into seven longitudinal compartments for anodes and six longitudinal compartments for cathodes. These, again, are subdivided into twelve compartments, giving eighty-four anode compartments and seventy-two cathode compartments. In the anode compartments are placed sheets of lead coated with a non-conducting insoluble varnish, having mixed with it a conducting material practically unoxidizable. The cathode compartments contain perforated zinc cages filled with zinc shavings. Both cathode and anode boxes have terminals, which are fastened to the respective positive and negative poles of the electro-plating dynamo in use, which has a capacity of 400 amperes under twenty-five volts pressure. The separation of the cathode and anode compartments is effected by means of a specially prepared canvas, which, while not interfering with electrolysis, prevents the undue mixing of the anode alkaline solution with the cathode auriferous KCy solution.

This method of precipitation is found to roughly secure three times more speedy a precipitation than the Siemens-Halske method and to extract 90 per cent (in place of the Siemens-Halske 75 per cent) of the gold contents.

The routine of the various washes is that obtaining generally throughout these fields, with the exception that at present only two solutions are being used (by reason of the smallness of the plant) in place of three.

The gold-coated zinc shavings which have done their work in the extractor boxes of this—the electro-zinc—process are then placed in the extractor boxes of the MacArthur Forrest process, the zinc-gold couple in this form having the power of readily precipitating the gold from the ordinary KCy solutions, while the zinc is dissolved and the clean-up is made in the usual way.

At the request of the management of the Comet, Mr. Bettel is making a special clean-up for the purpose of plainly demonstrating the value of the extraction. The sampling and assaying are done by the company's usual staff, the inventor's laboratory being devoted solely to private research and assaying for private guidance.

The first 200 tons of solution running through the boxes assayed .09 dwt. per ton before precipitation and .01 dwt. after precipitation (fine gold), notwithstanding that the zinc had been soaking in the solution without electrolysis for three days—an occurrence which would have effectually stopped precipitation by the Siemens-Halske process. The second solution contained only traces of gold, according to the company's assayer, after precipitation.

The net issue of the results got, up to the present, by practice on a working scale under distinctly unfavorable conditions is that, commercially, the scheme shows up better than as a laboratory experiment and that the value of the process is pretty well established. There will be a widely felt curiosity to learn the full powers of the new method as shown by careful analysis of the results got by regular work under ordinarily favorable conditions.

*Condensed from *South African Mining Journal.*

English Investment in American Mines.

TO THE EDITOR:—Adverting to the several letters that have recently appeared in your columns on or in respect to "English capital in American mines," not the least appreciable in connection therewith is your own general recognition of the proposition or principle that development work undertaken and performed in consideration of acquiring an option to purchase, or not, within a specified period is "not likely to be of detriment to the present owners."

A fitting rejoinder to the correspondent who wrote: "No good mines can be gotten hold of without putting up the cash at once," and which appeared in your issue of the 20th ultimo, may be found in the same number in the very interesting and instructive letter of Mr. Almarin B. Paul, in which he says:

"If English investors allow themselves to be led into unprofitable ventures it is their own fault, as there are any number of individuals in these latter days having a thorough knowledge of vein structure, value of ores, and of extraction of the metals, to steer clear of bad ventures."

To proceed upon any other hypothesis than is here presented by Mr. Paul would be going contrary to common sense and sound business methods. Consequently the contention that if an intending or possible purchaser desires to purchase he must put up money at once cannot be considered seriously. Mines are not and cannot be bought and sold as bushels of wheat or barrels of beer, and before any responsible party can be induced to incur the expenses essential in the preliminary examination, etc., of a mining property it is imperative that a reasonable agreement as to time, as well as to price, should be granted. Offering a good mine does not in any way lessen its intrinsic value to the owner, though it may and doubtless does interfere with the chances of its being taken up by the promoter with unscrupulous propensities, who invariably relies more upon the names he may secure for directors and the "art" he may possess in preparing a prospectus that is likely to be "swallowed" by the guileless and gullible public than he does upon the actual or prospective value of the property. That California mine owners are not all opposed to transferring their mines for a consideration to the care of the British or foreign capitalist is shown by the fact of there having been within four or five weeks three large companies offered on this side, two in London and one in Glasgow. The response given by the public in the matter of subscriptions to one of the two advertised here, viz., the California Exploration, Limited, was, I regret to remark, reported as very disappointing. What response the other one (the Great Northern Industrial Gold Co., Limited, California) may receive is not yet made public, but the promoters have at all events made the most of their directors' names, though whether their having done so will be of great advantage remains to be seen, and a Glasgow correspondent of the writer has asked where the capital (£400,000) is to come from.

The population of California is not big enough yet to do anything like justice to its great mineral wealth, and, such being the case, capital ought to be encouraged in every legitimate manner possible, without regard to where it may come from. If it can be obtained from the Middle or Eastern States so much the better; but if it cannot be "coaxed" there, then it should be sought in the most likely or most satisfactory sources of Europe—that is, if Californians wish to move with the times and not "wall themselves in" against the adventurous spirit and enterprise of the age. Yours truly,

London, Dec. 23rd, '97. RANDOM.

Hydraulic Mining.*

NUMBER IV.

Water Distributing and Gravel Washing Apparatus.—While the dam and the ditch with its appurtenances are being constructed, the gravel-washing and the gold-saving implements and apparatus should be gotten on the ground and put in place, the point where they are to be located being immediately under and in close proximity to the lower end of the ditch. At its lower extremity the ditch empties itself into a section of flume, at the end of which is situated the bulkhead or pressure box, a large oblong receptacle, built of strong planks and so called because the head or pressure of the water is here measured.

Connected with or located immediately above this structure is the sand box, a square compartment sunk several feet below the floor of the flume, the design of this box being to catch any sand or fine gravel coming down the ditch, such material, when it reaches this point, falling into the sink, being the depressed portion of the box, and is there retained. Through a gate at the side of the box this stuff is discharged as often as its accumulation makes it necessary. If much sand is allowed to enter the sand pipe it tends to impair the efficiency of its action.

The pressure box, with a width of about six feet, varies in length from ten to thirty feet, a greater length being required when it has two feed pipes to supply, also where the sand box forms a part of it. For the sand box a wooden apron is placed in the bulkhead and so arranged that it catches the sand and drops it into a chamber below, which is supplied with a discharge gate. A gate is set at the upper end of the pressure box to prevent any floating stuff entering it. There should be water enough in this box to cover the supply pipe to a depth of several feet that no air, or as little as possible, be carried into it, to which end this box is usually divided into two compartments, the water being brought into a placid state in the upper before it enters the lower one. That the water supply and exhaust be kept in equilibrium as near as may be, a waste gate should be placed in the flume above.

The main supply pipe starting from the bulkhead should descend to the washing pit with as few deflections, rises or depressions as possible, as these not only tend to retard the passage of the water through the pipe, but also promote the collection of air within it, rendering an explosion imminent. To obviate this at all times, and to guard against it when filling the pipe, at which time it is much increased, air valves are to be placed at suitable intervals along it. All large water pipes should be equipped with a sufficient number of air valves, these escapes being provided with brass floats, as the wooden ones are apt to swell, and, becoming wedged in the valves, the pressure of the air without is insufficient to press them down. When the bank down which the pipe has to be carried has much inclination, it should be placed on a stout frame work, and, besides being braced on both sides, should be heavily weighted with bowlders as a security against any movement which, should it occur, might cause much inconvenience and possibly serious damage. This pipe for several joints at its upper end is much enlarged to ensure a more free admission of water. Below that point it is all the way of uniform size, or as far down as the junction of the branch pipes, if any there are. In early times the letting on and shutting off of water was effected with a wooden gate, raised and lowered by means of a lever. For this crude and clumsy contrivance there has now been substituted in all large works the heavy cast-

*Begun in issue of Dec. 18th, '97.

iron gate operated by a screw, powerful and easily manipulated. Everywhere now, on the dams, ditches and reservoirs and in the washing pits, these improved structures are in use, differing but little, except in size, and in this according to the service required of them.

A powerful machine of this kind is employed for admitting and shutting off water at the entrance of the main feed pipe. In the performance of this task care should be taken to let on the water gradually, as too great a rush might carry in so much air as to cause a disaster, this being a precaution to be always observed under similar circumstances.

The size of the feed pipe depends on the quantity of water to be transmitted through it, a pipe 22 inches in diameter being sufficient to pass anywhere from 1500 to 2000 miners' inches. When the quantity of water ranges from 3000 to 4000 inches, a 30-inch pipe should be chosen, the friction caused by the passage of the water being less, comparatively, in large than in small pipes. The iron used in the construction of these pipes varies from No. 16 to No. 11 and lower, according to the pressure to which they are to be subjected. For a 22-inch pipe No. 16 iron is usually employed for pressure up to 150 feet; No. 14 from 150 to 200 feet and No. 12 from 200 to 300 feet, the latter being about as great a head as the water is apt to be used under in hydraulic washing. For a 30-inch pipe No. 14 iron has been found to answer for pressure up to 150 feet and No. 12 from 150 to 275 feet.

Before being placed in position these and all other iron pipes to be used in connection with hydraulic mining should be immersed in liquid asphalt, such as is now being manufactured for this and similar purposes. Coal tar, with which these pipes were formerly coated, is now giving place to the asphalt preparation, it having been found equally cheap and more efficacious.

Formerly the lower end of the feed pipe was connected with what was known as the distributor, a short cast-iron box firmly anchored in the washing pit, the duty of which was to receive the water brought in by the feed pipe and distribute it to the several smaller pipes that lead to the giants or monitors, the number of these pipes corresponding with that of the machines to be supplied with water. Being ponderous, costly and liable to burst, the distributor has come to be pretty generally discarded, the plan of connecting all distributing pipes directly with the main feeder, as now practiced, having superseded it.

GLYCERINE is a good thing for tempering steel. The glycerine must have a density of from 1.08 to 1.26 at 150° C., and its weight should be about six times as great as that of the steel to be tempered. For hard tempering, add to the glycerine from one-fourth to four per cent of sulphate of potash or of manganese; and for mild tempering, add one to ten per cent of chloride of manganese or one to four per cent of chloride of potassium.

Mechanical Progress.

Wire Ropeway Across Chilcoot Pass.

On the 25th ult. this paper furnished its subscribers a map of the Klondike region, and from an inspection of the same it will be obvious that not far from Dyea is the much-dreaded and much-written-up Chilcoot pass. There does not seem, so far as noted, so much difficulty in passengers passing over the gap in the mountain chain as in getting goods over with any degree of dispatch and celerity; and later in the season this difficulty would become intense unless some means were provided to supply the thousands of gold seekers who must subsist and need good, substantial fatty food during the long, dreary days of an Arctic winter, with the thermometer far below zero, sometimes as low as 70°. No moralizing on the folly of people rushing into such a country unprepared will alleviate the condition of affairs which must exist there. From good authority it is learned that the Alaska Railway & Transportation Company of Seattle some time since had a careful survey made of the pass by a firm of experienced engineers of that city, and that a good, feasible route was found for the erection of a wire tramway.

The pass itself would not be so formidable if it were not for the terribly cold and high winds which blow occasionally, on one occasion the wind being so violent as to tear the transit from the grasp of the engineer and carry it beyond his control, doing irreparable damage. But, as it is, it acts as a terrible barrier to the prospector who has to pack his provisions in.

To get over this mountain pass the engineer of the company interested decided, after careful consideration, to adopt the Hallidie single rope system, and then at once ordered a line constructed in San Francisco for immediate shipment. Already most of the material has gone forward and the work of construction is well advanced; and it is believed that by the time this number is issued the entire machinery—cable, carrier, pulleys and driving gear—will have been shipped, leaving only a 45 H. P. engine to follow by next steamer. The company does not intend to transport heavy pieces, but to take the loads as packed for the mules and send them over. With the line now in course of construction 150 tons per day can be transported, or about 4500 tons per month; and the earnestness with which this work is being pushed speaks well for the foresight and business considerations which influenced such—as it happens to be—a humane undertaking. And while it is not to be expected that such a work will be carried through without some setbacks, the Hallidie system of tramway has been tried under so many difficult conditions that it is felt that relief will be at once the result of its completion.

By referring to the accompanying profile of the Chilcoot pass, over which the tramway will run, it will be seen that in a horizontal distance of 6000 feet it rises 1550 feet, and then in 1850 feet falls 400 feet to the level of Crater lake. The rocks on part of the route stand at an angle of 70°, and part of the line ascends at an angle of 35°. So abrupt are some of the gorges that clear leaps of 400, 500 and 600 feet are made, and in one instance a clear jump from point to point of 1430 feet.

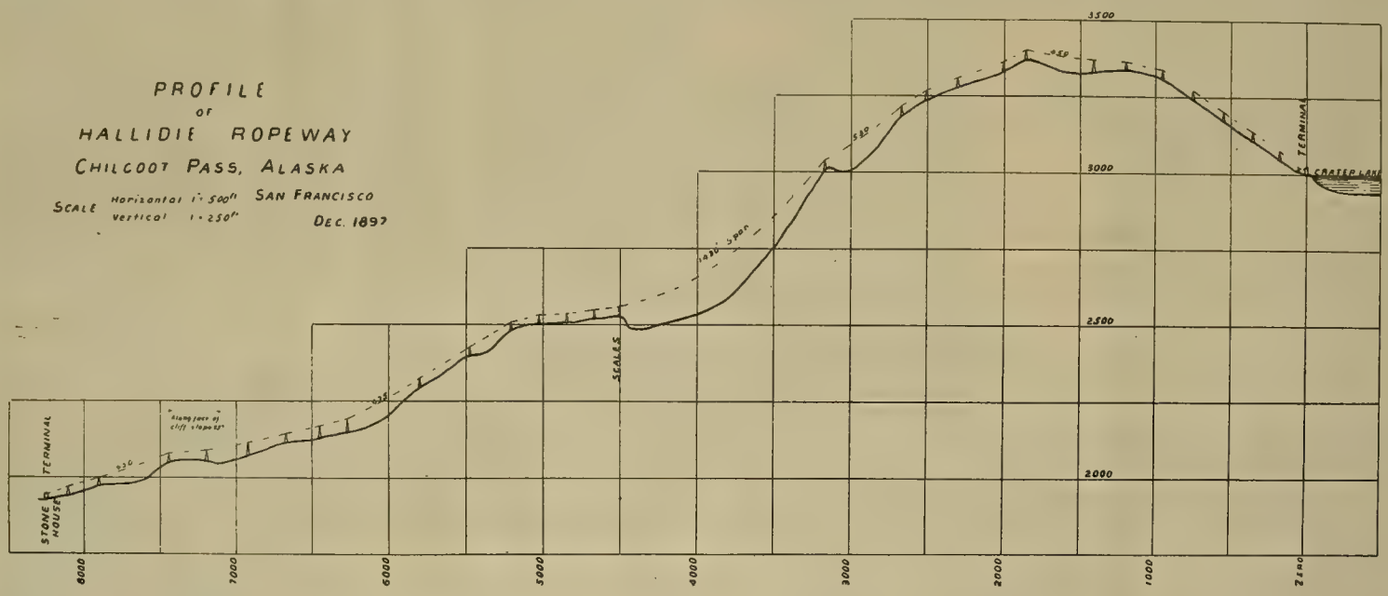
It is not proposed to permit passengers to pass over the line, if the business of the line would permit it, as, cooped up in a tramway basket and exposed to such extreme cold and high winds, they would reach their destination in a frozen condition.

Mr. Stixrud of Stixrud & Nansen, civil engineers, of Seattle, in charge of the work, was in San Francisco recently on business connected with this enterprise.

The trail begins where the Dyea river empties into the inlet, runs along the river and up the Dyea canyon, thence up a steep and rocky ascent to the summit, which is 3600 feet above sea level and seventeen miles from Dyea, thence by easy descent and across several lakes to Lake Linderman, thirty miles from Dyea. Horses and pack animals can be used for a distance of fourteen to fifteen miles from Dyea, but beyond this point to the summit everything must be carried on the backs of men.

For six miles from Dyea the route is nearly level and easy traveling, the river being navigable for canoes. Leaving this point one enters Dyea canyon, and thence for six miles through marshes, over boulders, across streams, to Sheep Camp, 1200 feet elevation. From Sheep Camp the trail is very steep, and two miles beyond is Stone House; thence two miles to the Scales, at the foot of the pass. Then begins the hard travel for one and a quarter miles—trail sometimes 45°—to the summit, thence by a fairly good road, half a mile long and a descent of 400 feet, Crater lake is reached, two miles long.

It will be noted that the wire tramway starts from Stone House, passes over the summit to Crater lake in an air line 1⅝ miles against 3¾ miles by the trail.



"PIG IRON" is a mere play upon the word "sow." When iron is melted it runs off into a channel called a sow, the lateral branches of which are called the pigs. Here the iron cools, and is called pig iron. Sow has nothing to do with swine, but is from the Saxon "sawan"—to scatter.

Brazing Crucible.

A newer process is liquid brazing. Several years ago it was demonstrated by a company formed for that purpose that a specially treated joint, plunged into molten spelter, would not only braze in a very few seconds, but would come out almost entirely free from scale, a brisk cleaning by a metal brush being about all the after treatment required. The process was a secret one; the most important point being the anti-flux, which was a preparation painted over the parts to which it was desired the spelter should not adhere. Briefly, liquid brazing consists in reducing the spelter to a molten form in a suitably shaped crucible at a high temperature and then immersing the joint to be brazed in the liquid mass. The surfaces to be brazed are painted with a flux and the adjacent parts with an anti-flux.

STEAM ENGINEER JOHN DUNN has a pretty piece of mechanism in the shape of a new and simple steering gear. The invention is extremely simple and is said to possess many advantages over other steam steering gears, for the reason that it is operated by a single rod, which is either advanced or drawn out, according to the wishes of the operator. The combination works similarly to the device in a pair of opera glasses that enables one to obtain a focus of the lenses. Regarding his connection with the filibuster steamer Three Friends, he humorously recites that it was in the hour of peril that the idea that has resulted in the completion of an almost perfect steam steering gear was conceived. "One day while out on a filibustering voyage to the island of Cuba a report arose on shipboard that a Spanish man-of-war lay to the eastward of our position and that her funnels had just begun to show signs of increasing steam. She headed for us. I stepped outside the engine-room to take a peep at her with my glasses," he says, "but I did not have the proper focus and began to turn the thumb screw affixed to the center bar of the glasses, when the idea struck me that, if the movement were reversed, with sufficient power back of it, the center piece could be made to revolve safely and very accurately. I investigated the matter and found that I was right."

BY a simple rule the length of the day and night, any time of the year, may be ascertained by simply doubling the time of the sun's rising, which will give the length of the night, and double the time of the setting will give the length of the day.

Scientific Progress.

Signaling Through Space Without Wires.*

In 1884 messages sent through insulated wires buried in iron pipes in the streets of London were read upon telephone circuits erected on poles above the housetops, 80 feet away. Ordinary telegraph circuits were found in 1885 to produce disturbances 2000 feet away. Distinct speech by telephone was carried on through one-quarter of a mile, a distance that was increased to one and one-quarter miles at a later date. Careful experiments were made in 1886 and 1887 to prove that these effects were due to pure electro-magnetic waves, and were entirely free from any earth conduction. In 1892 distinct messages were sent across a portion of the Bristol channel between Penarth and Flat Holm, a distance of three and three-tenths miles. In 1895 the cable between Oban and the Isle of Mull broke down, and as no ship was available for repairing and restoring communication, communication was established by utilizing parallel wires on each side of the channel and transmitting signals across this space by these electro-magnetic waves.

The apparatus (Fig. 1) connected to

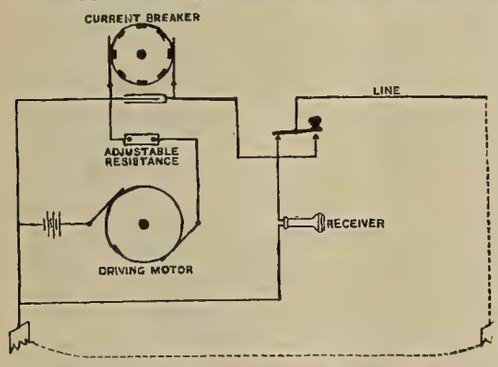


FIG. 1.—Diagram of connections of Mr. Preece's system.

each wire consists of: (*a*) A rheotome or make and break wheel, causing about 260 undulations per second in the primary wire. (*b*) An ordinary battery of about 100 Leclanche cells, of the so-called dry and portable form. (*c*) A Morse telegraph key. (*d*) A telephone to act as receiver. (*e*) A switch to start and stop the rheotome.

Good signals depend more on the rapid rise and fall of the primary current than on the amount of energy thrown into vibration. Leclanche cells give as good signals at three and three-tenths miles distant as 2½ H. P. transformed into alternating currents by an alternator, owing to the smooth sinusoidal curves of the latter; 260 vibrations per second give a pleasant note to the ear, easily read when broken up by the key into dots and dashes.

In my electro-magnetic system two parallel circuits are established, one on each side of a channel or bank of a river, each circuit becoming successively the primary and secondary of an induction system, according to the direction in which the signals are being sent. Strong alternating or vibrating currents of electricity are transmitted in the first circuit so as to form signals, letters and words in Morse character. The effects of the rise and fall of those currents are transmitted as electro-magnetic waves through the intervening space, and if the secondary circuit is so situated as to be washed by these etheral waves, their energy is transformed into secondary currents in the second circuit, which can be made to affect a telephone and thus to reproduce the signals. Of course, their intensity is much reduced, but still their presence has been detected, though five miles of clear space has separated the two circuits. Such efforts have been known scientifically in the laboratory since the days of Faraday and Henry, but it is only within the last few years that I have been able to utilize them practically through considerable distances. This has been rendered possible through the introduction of the telephone.

In July last Mr. Marconi brought to

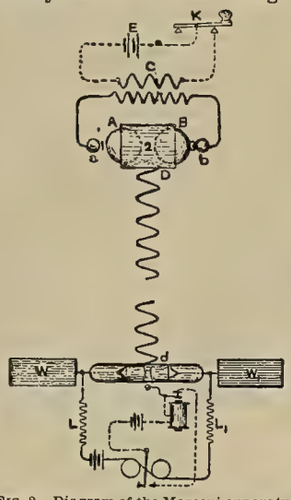


FIG. 2.—Diagram of the Marconi apparatus.

England a new plan. My plan is based entirely on utilizing electro-magnetic waves of very low frequency. It depends essentially on the rise and fall of currents in the primary wire. Mr. Marconi utilizes electric or Hertzian waves of very high frequency, and they depend upon the rise and fall of electric force in a sphere or spheres. He has invented a new relay which, for sensitiveness and delicacy, exceeds all known electrical apparatus.

The peculiarity of Mr. Marconi's system is that, apart from the ordinary connecting wires of the apparatus, conductors of very moderate length only are needed, and even these can be dispensed with if reflectors are used.

The Transmitter.—His transmitter is Professor Righi's form of Hertz's radiator (Fig. 2). Two spheres of solid brass, 4 inches in diameter (A and B), are fixed in an oil-tight case D of insulating material, so that a hemisphere of each is exposed, the other hemisphere being immersed in a bath of vaseline oil. The use of oil has several advantages. It maintains the surfaces of the spheres electrically clean, avoiding the frequent polishing required by Hertz's exposed balls. It impresses on the waves excited by these spheres a uniform and constant form. It tends to reduce the wave lengths; Righi's waves are measured in centimeters, while Hertz's were measured in meters. For these reasons the distance at which effects are produced is increased. Mr. Marconi uses generally waves of about 120 centimeters long. Two small spheres, *a* and *b*, are fixed close to the large spheres, and connected each to one end of the secondary circuit of the induction coil C, the primary circuit of which is excited by a battery E, thrown in and out of circuit by the Morse key K. Now, whenever the key K is depressed sparks pass between 1, 2 and 3, and since the system A B contains a capacity and electric inertia, oscillations are set up in it of extreme rapidity. The line of propagation is D *d*, and the frequency of oscillation is probably about 250 millions per second.

The distance at which effects are produced with such rapid oscillations depends chiefly on the energy in the discharge that follows. A 6-inch spark coil has sufficed through 1, 2, 3, up to 4 miles, but for greater distances we have used a more powerful coil—one emitting sparks 20 inches long. It may also be pointed out that this distance increases with the diameter of the spheres A and B, and it is nearly doubled by making the spheres solid instead of hollow.

The Receiver.—Marconi's relay (Fig. 2) consists of a small glass tube four centimeters long, into which two silver pole-pieces are tightly fitted, separated from each other by about half a millimeter—a thin space which is filled up by a mixture of fine nickel and silver fillings, mixed with a trace of mercury. The tube is exhausted to a vacuum of 4 mm., and sealed. It forms a part of a circuit containing a local cell and a sensitive telegraph relay. In its normal condition the metallic powder is virtually an insulator. The particles lie higgledy-piggledy, anyhow, in disorder. They lightly touch each other in an irregular method, but when electric waves fall upon them they are polarized—order is installed. They are marshaled in serried ranks; they are subject to pressure—in fact, as Professor Oliver Lodge expresses it, they cohere—electrical contact ensues and a current passes. The resistance of such a space falls from infinity to about five ohms. The electric resistance of Marconi's relay—that is, the resistance of the thin disc of loose powder—is practically infinite when it is in its normal or disordered condition. It is, then, in fact, an insulator. This resistance drops sometimes to five ohms, when the absorption of the electric waves by it is intense. It, therefore, becomes a conductor.

It is curious that hills and apparent obstructions fail to obstruct. The reason is probably the fact that the lines of force escape these hills. When the ether is entangled in matter of different degrees of inductivity the lines are curved, as in fact they are in light. Fig. 3 shows how a hill is virtually bridged over by these lines, and consequently some electric waves fall on the relay. Weather seems to have no influence—rain, fogs, snow and wind avail nothing.

The wings in Fig. 2 may be removed. One pole can be connected with earth, and the other extended up to the top of the mast, or fastened to a balloon by means of a wire. The wire and balloon or kite covered with tinfoil becomes the wing. In this case one pole of the transmitter must also be connected with the earth. This is shown by Fig. 4.

There are some apparent anomalies that have developed themselves during

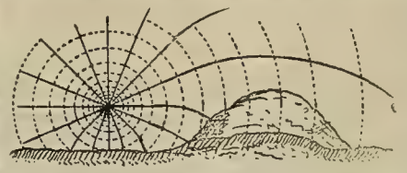


FIG. 3.—Diagram illustrating the way in which hills are bridged by the electric waves.

the experiments. Mr. Marconi finds that his relay acts even when it is in a perfectly closed metallic box. This is the fact that has given rise to the rumor that he can blow up an ironclad

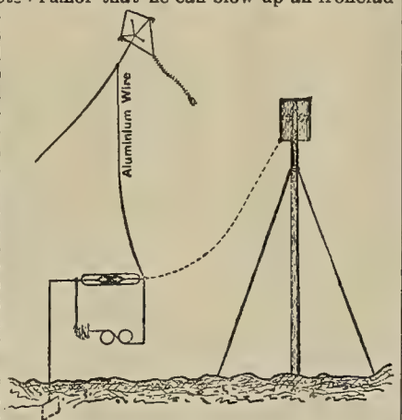


FIG. 4.—Diagram of Marconi connections when using pole or kite.

ship. This might be true if he could plant his properly tuned receiver in the magazine of an enemy's ship. Many other funny things could be done if this were possible. I remember in my childhood that Captain Warner blew up a ship at a great distance off Brighton. How this was done was never known, for his secret died shortly afterward with him. It certainly was not by means of Marconi's relay.

The distance to which signals have been sent is remarkable. On Salisbury Plain Mr. Marconi covered a distance of four miles. In the Bristol channel this has been extended to over eight miles, and we have by no means reached the limit. It is interesting to read the surmises of others. Half a mile was the wildest dream.

It is easy to transmit many messages in any direction at the same time. It is only necessary to tune the transmitters and receivers to the same frequency or note. I could show this here, but we are bothered by reflection from the walls. This does not happen in open space. Tuning is very easy. It is simply necessary to vary the capacity of the receiver, and this is done by increasing the length of the wings W in Fig. 2. The proper length is found experimentally close to the transmitter. It is practically impossible to do so far away.

It has been said that Mr. Marconi has done nothing new. He has not discovered any new rays; his transmitter is comparatively old; his receiver is based on Branly's coherer. Columbus did not invent the egg, but he showed how to make it stand on its end, and Marconi has produced from known means a new electric eye more delicate than any known electrical instrument, and a new system of telegraphy that will reach places hitherto inaccessible. There are a great many practical points connected with this system that require to be threshed out in a practical manner before it can be placed on the market, but enough has been done to prove its value, and to show that for shipping and lighthouse purposes it will be a great and valuable acquisition.

The Sun's Convulsions.

Cambridge professors ridicule the theory that a new world is being thrown off from the sun owing to the activity of sun spots. Prof. E. C. Pickering, director of the Harvard Observatory, says: "Such incredible reports discredit astronomy. The only things to be seen on the sun, to my knowledge, are sun spots. These do not produce any unusual excitement. Sun spots are not uncommon. This one is simply reported to be unusually large."

Prof. Young of Princeton University says of the theory that a new world is about to break away from the sun: "It's all bosh. The thing that has caused all this stir is the discovery of a new sun spot, which has suddenly burst into prominence. People can rest assured that a planet has not broken off from the sun and that there is no truth in the statement that it is traveling away from the sun and threatens to destroy the earth." The junior class, under the direction of Prof. Young, were interested observers of the new sun spot.

Prof. William R. Brooks of Smith Observatory, New York, reports the discovery of two groups of spots on the sun approaching the center of the disk. The publication of the statement has caused some sensational papers to characterize these spots as immense earth destroyers and are dancing in space with no known objective point, and one of them quoted from Revelations vii to sustain the fearful predictions it made.

"That is all nonsense," says Prof. John K. Ross of Columbia University. "Special students of the sun have long studied what are the effects of sun spots on the earth. No idea has yet been reached of what the proper effect is. These studies of the sun are shown by well authenticated records to have begun as early as 1610, while in China the records go back many, many years before that time. To-day all the leading observatories daily take photographs of the sun and keep an accurate record.

Creation of Fancy.—"The idea that sun spots break away from the sun's surface and are launched into space is

* Condensed from an address given before the Royal Institution by W. H. Preece, Esq., C. B., F. R. S., M. Inst. C. E.

them are generated the currents which the machine produces. These currents are produced by the revolutions of the poles or projections on the revolving inner steel ring. Around each of these projections there is a coil or copper strap, of which each turn is insulated from other turns and from the steel pole by mica. Current is sent through the coils on these polar projections, which strongly magnetizes the poles. The revolution of these magnetic poles in front of the copper bars in the outward part of the machine induces current in them. These currents are alternating currents, which are continually reversing in direction at the rate of 3600 times per minute. Three conductors are carried from the machine, which is wound for giving three phases. The currents in the different conductors do not occur at the same time, but have their maximum values in regular succession.

The recently completed Lachine Rapids plant, where a small fall of 14 feet has been harnessed to supply 25,000 H. P. power is another example of the remarkable development of the St. Lawrence, the water in which is now being used over and over again, each time at a lower level, for the driving of turbines, these in turn being employed to generate electric current.

Electrical Progress.

A Great Water Power at Massena, N. Y.

A great power project, that will in many respects rival the mammoth plants at Niagara, is quietly being laid on the shores of the St. Lawrence river at Massena, N. Y. The company is known as the St. Lawrence Power Co.; was organized under the laws of New York State with a capital of $2,000,000 and increased to $6,000,000, to engage in the work of development. As a whole, the project is one of the greatest for the development of a river's energy to be found outside of Niagara Falls. Unlike the largest power scheme at the Falls, the water will be conveyed to the turbines through a surface canal. In this respect the plan resembles that of the Niagara Falls Hydraulic Power & Manufacturing Co. at Niagara. The canal will be three miles long, start from Dodge's creek southerly to Grass river, one mile below. The level of the water in Grass river is about 45 feet below that of the St. Lawrence at the point where the canal will start, and the water will be delivered on the turbines at a head of a little over 40 feet. The width of the canal will be about 225 feet, the depth about 25 feet. Its longitudinal grade will be about 6 inches to the mile, causing the water to flow at a speed of about four miles per hour.

It is estimated that in the construction of this waterway over 8,000,000 cubic yards of material will be removed, and that this, if piled 545 feet high, would entirely cover a ten-acre field to that depth. However, as the excavation is practically all to be made in earth, the expense as compared to the service rendered will be moderate. The head of the canal has been so located on the St. Lawrence that a promontory will serve to deflect all the ice and drift of whatever kind toward the opposite shore when it comes down the river. The new style of dirt conveyor is similar in general design to those at work on the Chicago drainage canal, and is a massive piece of machinery. It stands 60 feet high, length 230 feet, mounted on trucks run on a railway on the bed of the canal. The entire length of the machine is traversed by an endless chain carrying buckets, and as fast as steam shovels can loosen the earth it will be seized by these buckets and carried to the other end of the conveyor, there to be dumped well outside of the line of the canal. The power house will stand on masonry piers built upon the rock bed of Grass river, will be 130 feet wide and 526 feet long. Large inlets will be built to receive the water from the stream, thus necessitating the removal and excavation of many cubic yards of earth and rock. The first installment of power to be developed will be 75,000 H. P., leaving water enough available in the canal to double this output when demand makes it necessary. The rock bottom of the Grass river will be excavated to a sufficient depth to allow the water passing through the turbines to flow freely away. Thus it is apparent that the great St. Lawrence river will be the head race of the power plant, and the Grass river will be the tail race. The conditions that will surround the installation of the power apparatus in the power station will be novel, and wholly unlike those found in other celebrated water-power developments. In the central station of the Niagara Falls Power Co. at Niagara Falls the turbines of the pit are horizontal, mounted on a vertical shaft many feet long, at the upper end of which, in the power house, are the great dynamos. In this new St. Lawrence plant the turbines will be vertical on horizontal shafts. Four turbines will be necessary to the operation of each dynamo, and as there will be fifteen dynamos, each of 5000 H. P. capacity, it will require no less than sixty turbines for the 75,000 H. P. to be first developed. The dynamos will be directly connected with the turbines, but 80 feet distant from them.

The machines are to be of the same capacity as those at Niagara Falls—the largest ever built. No other electrical machines exceed 2500 H. P. in capacity. A machine of 5000 H. P. involves the highest class of electrical and mechanical design; the only machines of this size that have ever been built or undertaken have been by an American company. There are many obscure and difficult points to be determined regarding the proportions of the iron and windings in such machines and the large size and great strains brought on the shafts and other parts of the machine are much more difficult to determine than in machines of ordinary size. The machines for the St. Lawrence Power Co. are not only of large size, but they involve a new design and are in many ways different from other machines. Each of these great machines will weigh about 350,000 pounds, the weight of one piece being as great as 125,000 pounds. The machine will stand 22 feet high above the top of the foundations, and each machine will occupy a floor space of 22 feet by 18 feet. The machines have horizontal shafts, which are in line and directly connected with the shafts of the water wheels by which they are driven. The shaft of a dynamo carries a great ring of steel which is very similar to a large and heavy flywheel. This steel ring carries at its circumference twenty external projecting pole pieces.

The ring and pole pieces are of one solid casting of steel. The ring has an extreme diameter of 15 feet and is about 3 feet wide. It is supported from the shaft by a massive cast-iron hub, with ten great radial arms or spokes. The steel for rings is designed for very great strength; it revolves at a speed of nearly two miles a minute, and the centrifugal force is such that each pound at the circumference tends to fly outward with a force of nearly 100 pounds. The speed of the machine is 180 revolutions per minute. This great steel ring with the projecting poles revolves inside of a large stationary ring or cylinder, whose inner surface is made of plates of thin, soft steel on edge. These thin steel plates are held by a massive outer ring of cast iron, which has a total height of 22 feet.

The thin steel plates which form the inside of the stationary part have slots in which are laid copper bars parallel with the shaft of the machine. These bars are insulated with mica, and in simply a creation of the brain of the writer. The spots are believed by most astronomers to be cavities or depressions in the photosphere filled with gases and vapors which are cooler than the surrounding portions and therefore absorb a considerable portion of light. The fact that they are cavities is shown by the change in the appearance of a spot as it approaches the edge of the disk. When a normal spot is near the center of the disk the nucleus is nearly central. As it approaches the edge the penumbra becomes wider on the outer edge and narrower on the inner, and just before the spot disappears around the limb of the sun the penumbra on the inner edge disappears, the appearance being precisely such as would be shown by a saucer-shaped cavity in the surface of a globe.

"The diameter of the umbra of a sun spot ranges all the way from 500 to 1000 miles for a very small one to 50,000 or 60,000 miles in the case of large ones. The penumbra surrounding a group of spots is sometimes 150 miles across, though that would be rather an exceptional size. The present one is estimated at about 100,000. Not infrequently sun spots are large enough to be seen by the naked eye, and they have been often so seen at sunset or through fog.

"The depth by which the umbra is depressed below the general surface of the photosphere is very difficult to determine, but it seldom exceeds 2500 miles, and is oftener between 500 and 1500 miles. The duration of a spot varies; sometimes it lasts a few days and sometimes a month or two. The spots never show themselves near the poles of the sun, but find their greatest development about 10° north or south of the sun's equator."

Personal.

N. W. TOMPKIN of Sonora, Cal., is in San Francisco.

T. T. LANE has gone from Angels, Cal., to Nevada.

C. E. BARRICK is Mgr. Magenta mine at Granite, Colo.

JAS. BREEN will be the Mgr. Le Roi smelter at Northport, B. C.

W. R. ECKART has returned to San Francisco from Grass Valley, Cal.

HON. E. C. VOORHEIS of Sutter Creek, Cal., was in San Francisco this week.

A. D. GASSAWAY, Supt. Magalia mine, is in San Francisco from Magalia, Cal.

F. E. WHEELER is supervising the erection of a milling plant at Creede, Colo.

E. M. ARMSTRONG, Supt. Oro mine, Iowa Hill, Cal., has returned from Woodland.

SUPT. GRAY of the E. P. Allis Co., Milwaukee, Wis., is in San Francisco this week.

R. DAVIS succeeds M. Thomas as Supt. of the Deadhorse mine, at Summersville, Cal.

S. R. PORTER has succeeded G. M. Ross as Supt. of the Baliol mine, Sutter Creek, Cal.

J. E. POINGDESTRE will have charge of the Yuba county exhibit at the Golden Jubilee Fair.

T. L. MITCHELL succeeds L. L. Patrick as Mgr. of the Montezuma mine in the Slocan, B. C.

GEO. BLAKE, Supt. Bell mine. Jamestown, Cal., has returned to the mine from San Francisco.

W. CAMERON, Supt. Occidental mine, Iowa Hill, Cal., has returned to the mine from Milpitas.

C. HENDEL of La Porte, Cal., is in San Francisco.

J. M. WILMANS of Newman, Cal., is in San Francisco.

SUPT. TANGERMAN of the American mine, Jackson, Cal., has returned to the mine from San Francisco.

M. P. BOAG of Berkeley is supervising the construction of a 40-ton capacity cyanide plant at Calieate, Cal.

PAUL A. FUEZ of St. Louis, Pres. Bimetallic Co., is on a visit to the mine at Philipsburg, Mont.

CAPT. S. NICKERSON has returned from Boston to Paschal, N. M., to take charge of the Val Verde copper mines.

COL. J. L. COLE leaves San Francisco to-day for Newcastle, Cal., to take the management of the Montauk mine.

CAPT. R. A. PARKER of the London Improvement Co. has returned to San Francisco from the Virginia mine, Mariposa Co., Cal.

D. H. COLE, of the Ribbon Rock mine, Sonora, Cal., is at the Zantgraf mine, Newcastle, Cal., inspecting his recent purchase.

MR. SAM'L J. HENDY, treasurer of the Cal. State Miners' Association, has been elected a trustee of the San Francisco Mechanics' Institute.

JOSEPH MCGILLIVRAY, who was for many years prominently connected with mining in this State, and is now associated with the London Exploration Co. in fitting up mines in British Columbia, is expected to return to this city for a short visit next week.

COLONEL W. H. H. Heuer and Lieutenant Arthur Deakyn, of the Debris Commission, visited the Kate Hayes hydraulic mine, on the South Yuba river, Cal., yesterday, to inspect the debris restraining works. An application of the owners for a permit to work the mine under the Caminetti act is pending before the Commission.

Coast Industrial Notes.

—Beef cattle in Reno, Nev., sell for $6.30 net per hundred lbs. on the cars.

—Cigars are now being made in southern California from home-grown tobacco.

—Output of beet sugar from southern California factories in 1897 amounted to 17,000 tons.

—Work has shut down on the construction of the Mexican Southeastern railway pending reorganization.

—Asphalt shipped from Santa Barbara county, Cal., in 1897 amounted to 583 cars, valued at $150,000.

—There are 37,000 acres in southern California set out to oranges and 12,000 to lemons, the latter being mostly young groves.

—In '97 the orange and lemon crops netted Riverside county $1,250,000. The southern California orange crop of 1897-98 is estimated at 12,000 carloads, or 4,032,000 boxes.

—The earnings of the Mexican National railroad for the second week of December were $117,581.30 as against $98,553.82 for the same week last year, an increase of $24,027.48.

—A party of fourteen prospecting engineers representing capitalists interested in the construction of the Nicaragua Canal are en route to Nicaragua, where they will investigate as to the feasibility of undertaking the completion of the canal and submit a report.

—The Stockton and Tuolumne County Railroad Co. organized in San Francisco last week to build and operate a railroad from Stockton through San Joaquin, Stanislaus, Calaveras and Tuolumne counties, to Summerville, Cal.; capital stock, $1,000,000; subscribed, $60,000.

—It is announced on presumably good authority that Symon & Camacho sold their railway, from Altata to Culiacan, State of Sinaloa, Mexico, and that the purchaser is C. P. Huntington. It is also stated that Mr. Huntington will at once extend the International from Durango to Culiacan.

—California's '97 fruit and vegetable pack was 2,426,000 cases, worth about $5,000,000, as follows: Tin, 58,224,000 cans, $1,145,000; Sugar, 700,000 pounds, $357,000; Fruit, 86,000,000 pounds, $2,087,000; Asparagus, 4,900,000 pounds, $100,000; Peas, 2,100,000 pounds, $24,000; Tomatoes, 21,600,000 pounds, $100,000; Boxes and labels, $291,000; Labor, $727,000; Fuel, etc., $160,000.

—The Commissioner of the General Land Office commissioned United States Forestry Agent Allen to examine the country in the vicinity of Lake Tahoe with a view to setting it aside as a forestry reserve. Agent Allen handled his report at Washington and recommends that a reservation be set apart in the vicinity of the lake. He thinks the reservation should include lands on the upper Truckee river and the head waters of the Cosumnes and American rivers. If this recommendation is carried into effect it will probably interfere with the lumbering operations now being carried on in the vicinity of Lake Tahoe. The lake is the largest body of water high up in the Sierra Nevada and the scenery in the vicinity the grandest. It is the source of the Truckee river, which has the distinction of rising in a lake which has no other outlet, and sinking in Pyramid lake, which has no outlet whatever, the immense volume of water which empties into it in the spring and early summer evaporating early in the season.

—In 1895 what is known as the Lyons Commission went to China for the purpose of remaining there two years to study the commercial and industrial condition of that country, with a view to increasing the business between China and France. The commission consisted of thirteen members, each representing a prominent French chamber of commerce. It is known as the Lyons Commission because it originated in Lyons, France. It remained in China two years, the last member returning from there last October. The commission has not yet made known the full results of its investigations, and probably does not intend to do so. It says the people are adroit, industrious and love money, but do not know how to make it. The mandarins, the lettered classes generally, are, above all others, discontented, and are openly or sullenly hostile. They are the principal benficiaries of the present regime. France counts largely upon her Indo-Chinese empire as a nucleus around which to build up her trade in China, and calculates to receive the co-operation of Russia in many ways. It is contemplated to open the way for a more extended commerce by beginning with bazaars, to be conducted by Frenchmen with Chinese in subordinate positions wherever it will be found possible to employ them. It is announced that Franco-Russian bazaars will be opened in St. Petersburg and Moscow during the coming winter. China, says one of the commissioners, is rich, but the people are lacking in economic machinery in keeping with that of wealth. The absence of transportation is the great obstacle to business; but even a greater hindrance is the lack of credit. Everything in the nature of rapid circulation and business confidence must be created. Population and production are only developed on the surface. The higher ability to produce and the greater capacity to enjoy and consume are dormant. The reforms contemplated will increase tenfold the productive capacity, with a consequent increase of the purchasing power of the enormous population. Evidences of a disposition to adopt modern methods are now conspicuous in the building of railroads and the introduction of machinery. The constantly growing foreign debt will soon force China to reform its financial policy, which can only be done by outside help. The nation that establishes trade throughout China, builds railroads, and introduces improved methods of water transportation will probably reform the finances and monopolize much of the trade.

Mining Summary.

CALIFORNIA.

Amador.

The South Eureka will be the first mine in the county to test the electric power furnished by the Blue Lakes plant.

C. A. Holbrook, who successfully worked the Belden mine tailings by the cyanide process, is working the tailings from the old Thercroft mine.

Prospecting is being pushed along the entire lode.

In Jackson, the new 40-stamp mill of the Argonaut, in its first month's run, produced over $50,000.

In Sutter Creek, the Wildman, South Eureka and Baliol are kept steadily at work.

Dispatch: A mill will be erected on the Hirschle ranch. It is understood that a San Francisco man has taken an interest in the mine.

The Dooley Bros. have their stamp mill on the McKinney property, near Mountain Spring, in operation.

A Jackson dispatch of the 5th says: The heaviest shipment of bullion ever made from Jackson was sent out yesterday. The Zella, Kennedy and Argonaut mines shipped a total of about $70,000. The first month's run of the Argonaut yielded over $50,000. This mine has made three shipments for the month.

Butte.

Suit has been commenced by the Lady Alice G. M. Co. against T. Z. Blakeman, D. Gage, H. Gage, W. Lynch, C. Helman. This is in the matter of the Cherokee Placer mine, also the Cherokee Drift Gravel mine.

Last August, Goodall, Perkins & Co. asked the Court for an injunction enjoining the Golden Feather Co. from maintaining a dam in the Feather river. The injunction was denied. When at the close of the season the Golden Feather Co. removed their dam, the case was disposed of in court last week, the plaintiffs awarded possession of the land, each party paying costs.

It is expected that in about two months the dredge at the Rio Bonito mines on the Feather river will be ready to launch.

Calaveras.

Good ore is being taken from the Lightner mine. The construction of a 20-stamp mill is assured.

The Ohio Co. is engaged taking out pay dirt.

After a wash-up of 300 carloads of gravel at the Lone Star, near Douglas Flat, the result was forty ounces.

Malespino, Williams & Co. will at once open up the Texas mine.

L. Grider of the Chilcoot mine, Douglas Flat, will at once sink a new shaft and put on an engine, 24 H. P.

Prospect: Action was commenced in court last week by R. Johnson against P. Tautphaus, F. Boeckman, E. F. Liebirch, C. W. Lynch, F. H. Hall and the Eclipse Gravel M. Co., involving the ownership of the Eclipse gravel mine, near Mokelumne Hill.

Chronicle: J. E. Burton at the Green Mountain mine took out a crystal last week 11 feet 7 inches in circumference, 4 feet 2 inches long, 3 feet 6 inches wide and 3 feet 2 inches high, that weighs over 2200 pounds.

Del Norte.

Record: The high tides of a few weeks ago wrecked the black sand works at Little River, doing great damage, and the company just below Crescent City suffered much loss. On Christmas day again the sea asserted domination over those portions of the land and put weeks of labor at naught.

El Dorado.

(Special Correspondence).—The transfer of the Zantgraf group of mines from the Chapman Bros. to the Cole Bros., of which this is the first publication, involves not only a present large amount of money, but promises an additional sum in the work projected.

Included in the purchase is the Montauk. Some work has been done on the latter, but extensive prospect work is to begin on it forthwith, to be followed by the erection of a 20-stamp mill, if warranted.

The 20-stamp mill in operation on the Zantgraf proper is practically new. In this they are breaking in on the 800-foot level, with ore enough on the 700-foot level for a year's reserve. The plant is lighted and operated by electricity, with a 75 H. P. engine in reserve.

The property will be known as the Montauk mine. The general management will be with Col. J. L. Cole, who, with his brother, Mr. D. H. Cole, are the purchasers. Col. Cole says they expect to expend $50,000 in addition to the purchase price, which was $200,000. The new firm took possession of the property Jan. 3d.

Placerville, Jan. 4th, '98.

(Special Correspondence).—Work on the Spreckels-Mulky mine, which has been in progress over a year, is nearing completion in tunnelling for the channel, which was tapped at 300 feet. The property is two miles above Fairplay. The gravel encountered is about 7 feet deep, and averages over $1 per cubic yard, in coarse gold.

Fairplay, Dec. 31st, '97.

(Special Correspondence).—The Boneset mine, upon which considerable development work has been done, has been bonded to Hayward & Lane. The property is fourteen miles west of Placerville.

The Rose Kimberly near Rescue, which has been idle for some time, will be reopened. It is under bond, I am credibly informed, to Hayward & Lane.

M. Varozza has sold 438 acres, known as the Try Again gravel mine, to San Francisco people. Fred W. Cook is Supt. Operations will be extensively carried on, both hydraulic and drift.

Alderson & Brown have bonded seven claims near the Larkin to Eastern people. W. H. Meyers has bonded two claims adjoining his Lloyd properties.

Placerville, Jan. 3, '98.

Kern.

At the Wedge mine they are taking out ore that runs $150 per ton.

The Little Butte has begun hoisting ore from the 300 level.

The Merced had twenty tons milled, which turned out $1200.

Madera.

(Special Correspondence).—Impetus has been given to the mining industries of this county during the past six months; and the next report from the mint will undoubtedly show a much greater output of gold from this locality than has been credited to it for many years. Improvement is particularly noticeable in the Fine Gold district, where numerous mines and prospects showing evidence of value have long remained idle for want of sufficient capital.

The Standard mine, owned by W. J. Henderson, is producing a large quantity of good ore. For several months past the ore has been reduced in a steam-power arrastra. A 2-stamp mill has been ordered in San Francisco, and will be set up on Fine Gold creek within a few weeks.

The Lily mine, now owned by an English syndicate, is now supplied with a 10-stamp mill, which has been kept running for the past six weeks on ore of fair grade already on the dump. Sinking has been resumed.

The Mud Springs or Wilson and Berry mine has been extracting ore of good quality from the 400-foot level. A mill with two concentrators has been kept steadily running upon this ore for the past six months, and the returns have been extremely gratifying to the owners.

The Keating mine, adjoining the Mud Springs, has been bonded to Hanshaw, Baker and Peters for $10,000. A 3-stamp mill, run by a 15 H. P. crude-oil engine, has been set up at the mine, and sinking from the 100-foot level is being vigorously prosecuted.

The Starbuck mine, on Fine Gold creek, near Gold postoffice, is showing a good vein of ore running upwards of $30 per ton. The ore is crushed in a 5-stamp mill, situated at the mine, and run by a 6 H. P. gasoline engine.

The old Taylor and Frazier, or Bonanza Queen, mine, now known as the Magnet, is being reopened by Messrs. Aram and Spargur. Some superficial work was done upon this vein ten years ago, and since that time no work has been done upon it until now. The vein shows every evidence of being a permanent fissure, and at several points along its course large bodies of good ore have been exposed. At the point where a shaft is now being sunk about 2 feet of ore is in sight, which will mill $15 per ton.

Gold, Jan. 3rd, '98.

The Ne Plus Ultra copper mine, between Berenda and Raymond, is reported sold to Stockton people; price, $15,000. The mine was closed down in '77 owing to the low price of copper and the high rates of freight demanded by the railroad company. In June, '96, the parties to the present purchase, under a contract, resumed work on the mine, and the results were so satisfactory that they have taken advantage of the option and will erect reduction works on the ground. The working of the mine will be pushed by the new owners.

Mariposa.

(Special Correspondence).—Philip Corcoran and E. C. Loftus have bonded the old Barrett ditch on the Merced river at Pleasant Valley with a view to installing an electric plant to furnish power to their mines in the Flyaway district and perhaps also to some outsiders. They expect to secure a head of about 100 feet at the power station.

The Merced Co. announces an almost total suspension of operations, to begin during the present week. Many of the miners have already been laid off, and the rest are cleaning up chutes and loose ore which will only occupy a day or two, and the mill will be closed during the present week. The reduction will affect about three-fourths of the present force, which now numbers about 100 men. A few men will be kept at the Mary Harrison mine, enlarging the present 170-foot vertical shaft from two compartments to three. On completion of this the shaft will probably be sunk about 300 feet more and some drifting will be done, but no more than twenty-five or thirty men will be employed on this work. The management is apparently tired of the clumsy policy heretofore pursued in stoping its ore at a depth of 200 feet below the bottom of the shaft, and will try and bring the development work at least abreast of the ore extraction. There is also under consideration the project of removing the 40-stamp mill from its present location on the west vein to a point near the Mary mine, thus obviating the expense of a four-mile haul from mine to mill. This distance is now made over the company's tramway at a cost of about 15 cents per ton, but owing to faulty construction the tram line has never given satisfaction, and it may now be abandoned.

Mariposa, Jan. 4th, '98.

Mt. Gaines, at Hornitos, is running full blast. They are working twenty-five men and the mine looks promising.

R. A. Parker of the London Improvement Co. visited the Virginia mine, near Coulterville, last week. The mill of the Virginia is nearing completion.

Nevada.

(Special Correspondence).—The Grizzly Ridge mine, at North Columbia, adjoining the Delhi on the north, at which work was recently renewed, is to be reopened at once. There are five claims in the group, and 185 feet of tunnel on a 6-foot ledge of fair grade ore.

North Columbia, Jan. 1st, '98.

The Alder Creek Co. owns, among others, a mine near Blue Canyon that has ore ready for the mill, yielding $7; the concentrates run $29 per ton. The company has a 3-stamp mill in operation, and will add twenty. Development work is pushed in three levels, and ore will soon be ready for the new mill. The mine is across the American river from the Pioneer. The cost of treatment is stated to be 71.2 cents per ton.

The shaft on the Reddick mine, one and one-half miles above Nevada City, is 500 feet and a drift on bedrock is 150 feet. The edge of the channel has been encountered and the gravel is good. The owners are mostly Grass Valley citizens.

The Supervisors appropriated $2000 for a mineral exhibit at the Golden Jubilee Fair.

Telegraph: Work in the Crown Point mine, Grass Valley, has been suspended temporarily.

Union: The Unity struck a new ledge of high-grade ore. A station is being cut at a depth of 350 feet.

Placer.

Glen mine, on Duncan canyon, is opening ground to breast in spring. This is one of the permanent and paying enterprises of eastern Placer.

The Blue Eyes, half mile from the Glen, is waiting for water. This has been hydraulicked for two years and paid from the grass roots.

The Bald Mountain gravel mine has been operating for several years. A party from San Francisco are operating with complete equipment for extensive work.

On the Flat Ravine quartz ledge, operated by Savage & Co., a tunnel is 600 feet on the ledge.

Collins & Morehead; Sellier, Murray & Larrabee, and Schippman & Ferrier, have made locations on which development work has been done with encouraging results.

Canada Hill mining district contains a number of promising claims. The Hobson & Payne Co. are running gangways and upraises preparatory to stoping.

The Gostlin & Worden gravel mine, idle for many years, has discovered the pay lead again and is working.

The Pioneer Supt. says the winze is down 34 feet; the vein is 6 feet wide at the bottom in ore that will mill $14 per ton, weather fine, water short, cold weather and ice having interfered with the water supply, running fifteen stamps slowly by day and faster by night. The company has twenty stamps and is considering a plan to dam the north fork of the American river about half a mile above the mill, thus securing a steady supply of water. Preliminary steps are being taken to this end, and the company has money to meet the expense.

Plumas.

Bulletin: Twenty men are employed at the Green Mountain mine, near Crescent Mills. It is reported that a large mill will be erected next spring. M. Wilkinson is Supt.

G. W. and C. Penman at Spring Garden opened the Alta placer mine on Greenhorn creek.

Russell & Waldren sold their quartz mine near Bucks Ranch to Van Leicht & Bergen of San Francisco. It is a large body of low-grade ore, about $6 per ton.

San Bernardino.

L. E. Aubury, from eastern San Bernardino county, reports a snowfall over an extended area. From Manvel to the edge of Death Valley from four to six inches of snow had fallen. The cold was extreme, and old-timers on the desert declare that such a blizzard had not visited that section in over twenty years.

At Dale City the mill owned by C. F. Baird is running day and night. In connection with this mill Mr. Baird has a cyanide plant with a capacity of ten to twenty tons a day. Gold bricks are shipped from Dale City every week. Mexicans working in the placers took out two nuggets recently, one a $40 nugget and one a $30 nugget. These same Mexicans took out $200 in less than a month last summer and have taken out nearly as much in two weeks this fall. Ferguson Bros. intend to put up a 10-stamp mill.

San Diego.

The Mountain View M. Co., Julian district, has returns from a mill run of over $100 per ton. The directors have let a contract to sink 100 feet, with a view to drifting along the vein.

J. R. Lowe has sold to R. Gardner for $2000 the City of Richmond gold mine near Julian.

The Cincinnati Belle gold mine at Julian has been attached in the suit of H. Crinklaw against the Banner M. Co., brought to recover $5000 claimed to be due for salary as superintendent.

Sierra.

The following gravel mines are in operation on Poker Flat: Scott, Bruckerman, Wolff, Winchester, Sullivan & Pearson, Jones & O'Donnell, Clark & Corbett, Klondike, Grasshopper, Hidden Treasure, Bunker Hill, Liberator, Orleans, Ballarat, Lost Streak. The following quartz claims are working: Alhambra, Copper Ledge, Pennsylvania, Straussner.

Sharkey & Payton have completed 50 feet of tunnel at the Keystone mine.

Messenger: The new mill at the Sierra Buttes is progressing. The Supt. hopes to have it crushing Feb. 1st. Work is also being done in the mine.

Shasta.

The Gold Hill, near French Gulch, is working steadily.

On the Morton placer mine at Fool's Gulch McCloud & Johnson have two shafts each 50 feet in good ore.

The mines in French Gulch, the Brunswick, Niagara, Milkmaid, Vogel and Reinhaus, are doing well.

The Clark Bros. mine is again in operation.

Miners of this county are complaining of a scarcity of water.

Siskiyou.

Phelps & Osmond are hydraulicking at Oak Bar.

Bonham & Linbcock commence work on the Siskiyou placer mine the 15th inst.

A Chinese Co. is working the Klamath river.

The Parker hydraulic mine on McKinney creek is doing well.

Lange & McCarthy have opened a 2-foot ledge on Barkhouse creek.

The *Advance* hears that between $5000 and $6000 was cleaned up by the last run at the Black Bear mine.

Journal: The third shaft of the Blue Gravel mine at Greenhorn will soon be down to the 100-foot bedrock level, when more men can be put at work in drifting and hoisting out gravel. By having three shafts a greater amount of pay gravel can be taken out than in running long drifts from one or two shafts, besides securing better air at the bedrock. As the gravel is taken out near the shafts, more new shafts will be sunk to get closer to the hoist, as the pump drains all the shafts equally in raising the entire bedrock water in the basin, which is used in connection with the surface water of the creek in washing the gravel dumped into the sluices. The claim is now said to be yielding handsomely, and this system of putting on a large force when water is abundant will enable the owner to get out big pay. Working the claim with a small force when water is scarce does not produce even proportionate results, as the same work is required in pumping and hoisting by steam as when a large force is employed.

The old Gold Ball mine at Salmon river has been started up, all the indebtedness and litigation having been settled. The new company in charge, with a wealthy Ohio syndicate as backer, intend opening the mine on an extensive scale, and have a large mill to do the crushing.

The King Solomon quartz mine, nine miles from the Gold Ball mine at Salmon river, will have a new mill in readiness for crushing by spring.

The Colorado men, who visited the Hegler mine on Humbug last week, have made a bargain for its purchase.

The quartz mill of the Dannenbrink Bros. at Know Nothing creek, Salmon river, is now kept running steadily on good paying ore. They have a 10-stamp mill operated by water power of 30 inches with 650 feet pressure.

Advocate: The Monarch mine on French creek has begun work on the 200 level. They have a 3-foot ledge.

At the King Solomon mine they began stoping from the 50-foot level.

The Manaha mine, near Etna, has begun operations under the supervision of W. C. Stanley.

Reporter: On the Allen mine D. Jones is taking out ore from the Pinkham, the Steel, Extension and Cosmopolitan mines in Quartz valley.

The tunnel on the Boomer mine is in 40 feet. The vein is 6 inches on the surface, from which 18 tons realized $35 per ton.

The ledge on the Sunshine varies from 6 to 18 inches. A crushing of 16 tons yielded $124.

D. Manning of Oro Fino has a vein 12 inches wide. A 200-foot tunnel taps the vein at 175 feet deep.

Journal: The Gold Ball Quartz mine at Salmon river, long in litigation, is in active operation under the supervision of S. P. Ball.

Tonkin & Sons are busy on the Fagundes mine. A tunnel is being run to tap the ledge.

The S. R. H. M. Co., on the Wm. Klein, are extending the ditch and flume 3 miles, to operate that claim with two giants under a pressure of 250 feet.

LaFlesh & Sons are running on quartz from the Lodi ledge near Henley, and are realizing good pay.

Hathaway Bros. at Oro Fino have a 5-foot vein from which they are taking good ore.

Trinity.

Work on the Bloss & McCleary mine has begun. The ditches, flumes and pipes will be enlarged and the property operated on a large scale.

At the Trophy mine, on the Trinity-Humboldt line, a giant is operated under a pressure of 250 feet.

Amos Hill of Coffee creek has sold the Yellow Rose of Texas quartz mine to J. and I. Rider of Napa for $2500.

Tulare.

The Golden Copper King, owned by Biggs & Waite of Fresno, is 100 feet wide and assays nineteen ounces in silver and $21 in gold to the ton, and 20 per cent copper. It has a shaft 45 feet and a tunnel 50 feet.

Tuolumne.

Capt. W. H. McClintock, Supt. of the Rhode Island and Philadelphia mines, makes the following computation on the gold output of Tuolumne county mines for 1897: Norwegian, $75,000; Jackass Hill, $50,000; Rawhide, $500,000; Little Gem, $5000; Dutch, $200,000; App, $50,000; Santa Ysabel, $25,000; Jumper, $240,000; Eagle-Shawmut, $30,000; Dondero, $15,000; Bald Mt. and Brown's Flat, $50,000; Golden Gate, $215,000; Star, $24,000; Keltz, $30,000; Belleview, $30,000; Black Oak,

Work has begun at the Spring Gulch mine.

The Tarantula started up the new machinery this week.

The Rappahannock will sink to the 1000-foot level.

Good ore is being taken out at the Grizzly mine, near Summersville.

C. Ross & Co. will put up a custom mill near the Mascot mine.

At the Yellow Jacket, at Arrastraville,

some of the rock goes as high as $200, while the average is over $50 per ton.

The Woods Creek mine at Yankee Hill has closed down for the winter.

M. Breckon has leased part of the Hudson & Calhoun mine at Saw Mill Flat.

At the Over mine on Bald mountain the shaft is down 65 feet.

On the Haskell placer mine work is being done at the depth of 80 feet.

Gould & Doyle are opening a property at Horseshoe Bend, on the north side of the Stanislaus river.

Stover & Shorey are developing a property on Doyle's ranch.

$150,000; Confidence, $25,000; Dead Horse, $75,000; Lady Washington, $20,000; total, $1,809,000. Number of stamps in operation, ninety-three.

The Pirate mine, at Sugar Pine, has been sold. The purchasers are running a tunnel.

One-fifth of the Blue Star mine, at Summersville, has been sold to J. W. Reddish.

Yuba.

Thurston Bros. at Mount Hope have their mill nearly finished and have quartz ready to start it.

At the Independence mine the crushing is ten tons every twenty-four hours and the return is $8 a ton.

NEVADA.

Tribune: Up to two years ago, when the present management took hold of the Dexter at Tuscarora, it had in past years been productive of $182,000 in dividends. Since that time shipments of bullion, cyanides and crude ore have gone to Salt Lake, 55 per cent of the owners being Salt Lake people. During the year the company have spent $100,000 for a mill and improvements, which it will cost the company to carry out their plans. The company is now building a 40-stamp mill, which will be completed by Feb. 1st, and an electric power plant with a ten-mile pole line from Niagara creek, on Chagnon ranch, to furnish power and light for the mine and mill. During the fall of '97 the company erected a cyanide mill of ten tanks of fifteen to twenty tons each, or a daily capacity of fifty to sixty tons, and which will work the tailings. The ore is free milling. The country rock, it is said, goes from $2 to $8 a ton. Forty men are employed in the mine, J. Hickey, Supt.; two shifts are run. The mine is fifty-two miles north of Elko, in Tuscarora mining district, and is a $3 a day camp.

A large deposit of medium grade ore in the Yuba of the Pioche Con. Co.'s group has been opened, and a discovery is said to have been made of a method of treatment by which nearly all its value can be extracted. The ore will average 20 per cent lead and carries from $7 to $15 per ton in gold. Little of it can be sorted down close enough to pay for shipment, but by concentrating, then leaching the residue, a very close extraction is obtained. The process is one which the Godbe boys have been experimenting with for two years past, and the works here are the first in which it has been used on anything of a large scale. The Half Moon group of the Pioche Con. Co., the Old Timer group and Schofield's all carry gold in sufficient quantities to make them paying properties under the new method of reduction.

The State Line M. Co.'s mill is completed. One hundred men are at work in the camp.

W. Jewell is running a 50-foot tunnel on the Security claim.

The Boston-Nevada Copper M. Co. at Yerington is showing up a new body of ore. They have completed two tunnels 320 and 290 feet and are drifting on the main ledge.

The tunnel on the copper claim of Young Bros. at Mason Station has reached 30 feet. Surface samples show good ore.

Virginia *Chronicle*: The Scotch company which contemplated the working of the Comstock waste dumps has laid off the men who were working the Ophir waste dump and discontinued the operations there. It is understood that the scheme they had in hand has been abandoned. The test run of Ophir waste, made at the Kinkead mill, is said to have proved unsatisfactoy.

The nickel works at Cottonwood are at last a success and the metal is now being successfully produced in commercial quantities.

The antimony property, near Mill City, was bonded to a Chicago company for a year. The figure is said to be $10,000. M. Sohr will commence operations at once. The company will put in a concentrating plant.

OREGON.

The Big Four hydraulic mine on Pickett creek, at Grants Pass, is kept busy day and night.

J. W. Sherer last week, on Rogue river, brought thirty ounces of gold to Grants Pass from a twelve days run.

C. W. Bursdsal, near Oro Fino, has struck a 2-foot vein of high-grade ore.

Much development work is being done on quartz and placer mines in Douglas county.

The Miller ledge, Josephine county, in its first six weeks run cleaned up $60,000. The owners are Eureka, Cal., people who paid $28,000 cash for the property. The vein is 18 feet wide.

Browning & Hannum got $1540 from eleven tons of ore on Grave creek, in Josephine county.

W. H. Reid is running a drift in the Hammersley mine that is turning out $75 ore. The ledge is 2½ feet.

Portland and Eastern people will construct a smelting and copper refining plant. Among those dentified with the enterprise is Samuel Barron. The proposal is to erect a 400-ton plant.

The Denny group, near Baker City, consisting of five claims, were sold to W. R. McCormick for $12,000. The purchaser has started a 6000-foot tunnel to tap the ledge at 2500 feet depth.

Goucher & Co. of Portland, on the Oliman Reece, near Grants Pass, have their No. 2 giant at work. The ground is said to be rich.

F. Huston, on Althouse creek, is ground sluicing a porphyry dyke, getting nuggets from $35 to $75.

C. Bennett, on the Marshall placer, is running two giants on a 10-foot bank.

R. C. McIntosh is running three giants day and night near Grants Pass.

H. D. Sluter is operating his placer on upper Wolf creek.

WASHINGTON.

The tunnel on the Paris, opposite Bossburg, is in about 80 feet and the character of the ores is improving. The Young America mine, in Bossburg district, has resumed operations under the management of J. Hanley.

BRITISH COLUMBIA.

J. M. Burke, Mgr. Slocan Silver-Lead Syndicate, Fort Steele district, made the final payment on the property. It sold for $40,000.

Returns from a shipment from the Alberta, Slocan, went $116 in gold and silver to the ton.

The smelter at Northport will commence operations about Jan. 10th.

News from Camp McKinney reports a strike in the Minnehaha. At a depth of 120 feet a 4-foot vein averages $50 in gold.

The Athabasca, near Nelson, made a shipment last week of twenty-five tons.

The Big Bump, near Craigtown, has been sold to R. K. Neil for $5000.

The Silver Island claim at Nelson has been purchased by W. C. Forrester.

The sale is reported of 500,000 shares of the Good Hope mine at Rossland to an English corporation at 3½ cents per share. The property adjoins the Good Friday on the north.

Transmission of power to Rossland by the West Kootenay Electric Light & Power Co. from Bennington Falls is promised Feb. 1st.

ALASKA.

The Alaska-Treadwell Mining Co. of San Francisco and Douglass Island have bought 5,000,000 feet of lumber for the two new stamp mills on the famous Treadwell mine. The amount of lumber required for immediate delivery is about 2,000,000 feet. Of this there will be 1,600,000 feet of dressed lumber. The balance will be heavy timbers running 18x24 inches, 33 feet long. The heavy timbers will be framed at the yards of the sawmill by workmen engaged by the Alaska-Treadwell M. Co. The lumber will be shipped to Douglass Island, beginning February 1st.

At Berners Bay the discovery was recently made of free gold quartz in the Bear mine. The ledge is 4 feet wide; the extent of it is not yet determined.

In the Bald Eagle at Sumdum 20,000 tons of good ore has been opened up. The upraise is 250 feet long and the ore body 6 feet wide. The mill started December 20th.

Juneau *Record*: The Black Maria, the oldest quartz mine on the Alaskan coast, was sold last week by D. Willoughby to the Thomas Investment Company, of Seattle, for $100,000. The Black Maria was located twenty years ago. It is a group of eight claims. About 9000 feet above the sea level, a tunnel runs in 160 feet on a ledge over 30 feet wide. A shaft has been sunk 9000 feet below the tunnel, to a point 27 feet below the salt water level. The ore in the shaft runs from $27 to $50 a ton, but as it is concentrating ore, expensive machinery is necessary for its development.

The December bullion product of the Alaska-Treadwell mine was $45,396, from 19,082 tons ore and 375 tons sulphurets, the latter yielding $16,212. The ore averages $2.37 per ton. The company will put up a new 300-stamp mill. It already has one of 240 stamps, the largest quartz mill under one roof in the United States. It is also proposed to introduce electric power from a distance, so that there may be no interruption to work in the winter season.

N. S. Trowbridge, Supt. of the Bald Eagle M. Co., Sum Dum, Alaska, is down from that mine, sojourning in San Francisco, and proposes to put on additional stamps. The Bald Eagle is a good example of an Alaska quartz mine successfully worked. There has been no attempt to make much fuss over it, but considerable money has been spent with satisfactory results. An 1800-foot tunnel, which cost $26,000, has been built and sufficient ore extracted to pay for it and other development work. This ore has been pounded up in a little 4-stamp mill, which, by the way, has an average record of twenty tons of dry ore daily, an unusual feat. The ore runs about $28 per ton and is treated at an average cost of $5. About 50 per cent is saved on the plates, the concentrates, which run as high as $400 per ton, being shipped to this city. Sum Dum is fifty-seven miles southeast from Juneau, and the mine of which Mr. Trowbridge is superintendent is almost at the water's edge. It is the intention to have twenty stamps in operation this year.

THE KLONDIKE.

Transcontinental railroads estimate that 250,000 people will attempt the journey to the Klondike in 1898. It is not deemed possible for all the transportation companies in Alaska to deliver anything like that number in Dawson during '98.

An interesting point in connection with the question of age of Klondike gold is that the ground remains perennially frozen, only the surface being thawed in summer to the depth of two or three feet. It would appear, therefore, that, like the placers of Siberia, these deposits have remained undisturbed and unaltered ever since the glacial period, and perhaps some such evidence of this will in course of time be discovered as was afforded by the remains of mammoths and other animals in the Siberian frozen mud. It is worthy of note that the comparative lowness of standard of the gold is, under the existing conditions, in favor of the view that the placer gold is derived from the erosion of auriferous quartz lodes formerly existing at a higher level, and has not been formed in situ by being deposited from solution. For, according to those who support the former view, placer gold becomes of higher standard than quartz gold after it has found its way into drifts, removed by solvent action of water, in which gold is not readily soluble. Since, however, the Klondike gold has been frozen up during a large part of the time since it was deposited in the gravel, it is obvious that it cannot have altered in composition so much as the gold in river sands further south, and might be expected to resemble the gold in the parent lodes, which is not usually more than 800 fine. The low standard of the gold is not so readily accounted for by the accretion theory of formation of placer gold.

Under date of Nov. 28, '97, John D. McGillivray writes from Dawson City: "The first dog teams are beginning to start, and many large parties are preparing to take the trail during the next few weeks. Many of these go well equipped. All the best dogs are being picked out and command fancy prices. Robes which sold last year at St. Michael for $3 are now worth $300 or more. At least 300 men will have left Dawson before Jan. 1. A large portion of these are men who lately came in and have left in disgust after selling their outfits. A number are going out with the intention of returning in the spring with supplies, which they believe will command high prices, and many are going out to offer good things to a confiding public. The people of the United States will be offered opportunities to invest in a large proportion of the mines of the Klondike district in a few weeks. Some of them going out are taking papers for good properties, but, besides these, all sorts of old-fashioned swindles are being concerted.

"The wage question is at last about settled for the winter. Miners are going to work practically upon the terms of the mine owners. A few experienced drifters are receiving $1.50 per hour, and on some rich claims in Eldorado creek $1.25 will be the rate, but a large majority of the men working for wages have agreed to accept $1 per hour. Owing to the strike, much valuable time was lost—enough to make a difference in the winter's output of from $1,000,000 to $2,000,000. Next summer there will be much less done for labor when drift mining is over for the year than at present, and those who are coming in next spring and summer should bear in mind that opportunities for obtaining employment before next winter will be very few. It is probable that many miners will leave here for the old districts or newly discovered creeks on the American side as soon as navigation is open on the Yukon and supplies begin to come in next May and June. It is probable that unless the better class of people at Fort Hamlin and Munook lay strong hands this winter upon the bad element which has gone down the river from points above, there will be considerable lawlessness. There is barely enough food to keep alive those who are on the river at or below Fort Yukon, if it is properly divided and husbanded. Among the last to leave Dawson for these points before the river was closed to the boats were a number of men who had lately arrived here, sold their outfits, and went down with the expressed intention of obtaining food from the trading companies' stores without paying for it. Of all who went down, but a trifling number were without money with which to buy sufficient supplies, but many who were well supplied with means announced their intention to insist that they should be fed free of charge. Besides these, there was quite a number of men averse to work if a living could be obtained without it—a class that is new to the Yukon country. Besides these, a number of thieves, who had committed depredations here or further up on the river and on the trails, have gone on down to avoid detection. A large majority, of course, of those who will winter down the river is of a very good class of men, and they may be able to control. Captain Ray of the United States army has his headquarters at Fort Yukon, and may be of use in case of trouble.

"It is claimed by the trading companies that there is plenty of food at these points, but they have probably underestimated the number of people to be supplied. There should be nearer 3000 than 2000 people in the Yukon country below Forty Mile.

"The Bella, owned by the Alaska Commercial Co., left here early in October with 150 passengers, including a number of women and children, all of them having been supplied with food enough to last them to Fort Yukon. She was delayed for several days at Forty Creek, which is next to Circle City, about the largest town in the Yukon last year, but which was practically destroyed at the beginning of the Klondike excitement.

"There are several hundred cabins, in nearly every one of which are articles of value, which were regarded by their owners as perfectly safe, and which would have been but for the incoming of so many dishonest people. The thieving passengers of the Bella looted nearly all of those cabins, carrying aboard the steamer everything movable they could find.

"Word now comes from Circle City that the miners had determined to allow no one coming down the river to stop at that place unless fully equipped for the winter. There is no government on the American side in all the Yukon country from the 141st parallel to the mouth of the river, a distance of nearly 2000 miles. There is one collector of customs at Circle City to see that bonded goods cross the line and the trading companies' whisky is not interfered with. There was located also a commissioner of some sort at Circle City when I passed through there in September, but he had received no instructions as to what his duties were. There came up here two months ago another commissioner and a Deputy United States Marshal, who were to establish their headquarters at Circle City. They are now both located on the British side of the line in Dawson, engaged in obtaining mining locations to take to the States for sale. There is need for immediate action by Congress toward establishing a strong government in the Yukon country."

CANADA.

The detailed report of the Geological Survey upon statistics of mines and minerals for the year '96 has been issued. It gives Canada's total mineral production for the year as $22,500,000, an increase of 125 per cent in ten years, the production in '96 having been $10,000,000. In the production of gold British Columbia is credited with over 64 per cent and Nova Scotia with over 18 per cent. The Northwest Territories, including the Yukon district, came third with 13 per cent, Ontario fourth with 5 per cent.

UTAH.

Tribune: The Germania Smelting Co. has started a reverberatory furnace of 100 tons daily capacity, and has sufficient copper ore in stock to insure a long run. In addition to the 3000 tons of old Copperopolis ore, there are accumulated shipments from the Ajax, over 1000 tons from the Highland Boy, and that from the Mingo and Hanauer. The run promises to be the most eventful in the history of valley smelting.

The search for gold on the Cannon group, at Mercur, is to be renewed on a bond obtained last week by C. H. Scheu and associates. The figure is understood to be $200,000. Work begins at once.

A carload of high-grade silver and lead ore from the Yuba, at Pioche, was sold last week in Salt Lake City.

The Crystal M. Co., at Marysvale, reported last week with fifteen tons of concentrates, to be followed by another this week.

The Chloride Point, at Mercur, shipped two cars of good ore last week.

The Northern Light, at Mercur, is running on high-grade ore.

The Grand Central, of Tintic, is now turning out copper which yields 15 per cent copper and $5 in gold. The shipment of this class of ore is the first made from the Grand Central.

The Conger mine, Bingham, is a new shipper; the ore runs 22 per cent copper, 29 per cent iron, 8 to 17 ounces silver, and high in gold.

IDAHO.

Manly & Klockman have secured a controlling interest in the Continental mine, near Bonner's Ferry, and are pushing work. They are down 65 feet on the ledge. They will erect a concentrator.

Development work in the Golden Chest, at Murray, has shown a new body of ore, which insures keeping the mill busy for four months.

The Daddy mill has started after being closed down two weeks.

G. Smith, Pine creek, bonded a group to C. Beisel for $15,000. Mr. Beisel is proceeding with development.

Chicago parties have purchased a controlling interest in two claims at Pierce City, and will develop them.

A clean-up of the Crescent, after eleven days' run, 5-stamp mill, produced 234 ounces of gold.

The superintendent of the Boise assay office estimates that the increase over 1896 is 25 per cent. Figuring on that basis, the total output for the year would not be far from $14,700,000. A comparative statement is:

	Actual Output, 1896.	*Estimated Output, 1897.*
Gold	$ 2,323,700	$ 2,924,625
Silver	6,474,765	8,093,456
Lead	2,953,280	3,692,840
Totals	$11,751,845	$14,710,921

Some estimates place the gold output higher than that given here, but these fail to take into consideration the immense amount of work done on gold ledges with comparatively no output. For example, the Florida Mountain M. Co. at Dewey has expended in the neighborhood of $500,000 without having taken out enough gold to satisfy the payroll for three weeks; and some confuse this development work with output. The figures herein given will not, it is believed, miss the output far.

In the northern part of the State there has been great activity in the silver-lead mines, the output being materially increased. These mines carry a large percentage of lead and can, therefore, operate even under the low price of silver. Other silver-lead mines in the southern part of the State have been unable to continue, however, and their closing down has materially cut down the percentage of increase, measured by the immense northern output.

In the southern part of the State attention has been given exclusively to gold mining, and the developments have unquestionably been the most extensive and important that have been crowded into any one year in the history of the State. In the Silver City district the old mines have maintained their record, some making flattering increases in output, and a number of new properties have been opened by outside capitalists, who have the greatest faith in the camp. The Trade Dollar this year has paid in the neighborhood of $450,000 in dividends out of a total output of about $575,000. The Trade Dollar expended $75,000 during the year for adjoining claims.

The De Lamar mine has not come up to its old-time output, finding it needed a new process to handle its ore. During the year it installed a new process.

In Boise basin many thousands of dollars have been invested in placer and quartz mines by Colorado, Pittsburg and Boston people. The placers will be worked with dredges, initial operations having just commenced.

Tribune: At Burke the Poorman and Tiger mines have been in continuous operation, and as the main working shaft deepens and levels are run from it, the ore bodies are found to improve. The output is about 2000 tons per month, the ore carrying 65 per cent lead and 30 ounces silver. From 150 to 200 men are employed. West of Burke is the Standard

mine, the product being 2000 to 3000 tons of concentrated ore per month, which yields from 60 to 80 ounces silver and 60 to 65 per cent lead. One hundred men forms about the usual working force. West of the Standard is the Mammoth and upon the same lead with the grade of ore and indications are that at equal depth it will become as valuable. At present the Mammoth is worked through the upper Standard tunnels. The output is about 500 tons monthly and from forty to fifty men are employed. At Mullan the Morning mine has been a success. The output of the two mines ranges fully 3000 tons per month. The Morning mine yields 15 to 20 ounces silver and 60 per cent lead. The Hunter has been producing about 500 tons of ore per month and employing fifty men. The concentrator was burned last August. A new mill, having improved machinery, will be erected in the spring. The Kansas City Smelting and Refining Co. has bonded a group of nineteen claims situated between the mines at Burke and the Morning mine at Mullan. On the north side the gold product has not varied much in recent years, being about $500,000, much the larger proportion of which come from quartz mines. The secret of success of all the properties, notably the Golden Chart, Idaho, Mother Lode, Daddy, Jenkins and Mastla, has been the ability to concentrate the tailings from the mills and save the sulphurets and kindred forms of gold. The average value of the concentrates is from $80 to $100 per ton.

MONTANA.

The Sunnyside mine at Meadow creek, under the management of G. H. Savage, shows work well under way. A good lead can be traced along the mountain for several hundred feet.

At the Alice mine, Walkerville, everything is progressing. The output of the company and ores that are sent in by neighboring mines is keeping the big mill in steady operation. The company's property has been productive of dividends amounting to $1,075,000, of which amount $80,000 has been paid this year.

At the Great Northern mine near Libby there is an unlimited quantity of galena ore ready for shipment. At the Selkirk claim they have encountered a body of copper ore running as high as 140 ounces in silver and carrying gold values.

The Ontario will have paid $202,500 this year.

W. E. Heki again pierced the Junebug vein and disclosed 6 feet of free milling ore of good value.

Tunneling into the Ontario mine will be accomplished by day's labor under the direction of the officers of the company instead of contract work. The vein is to be opened 500 feet below the surface, and the workings already opened are to be extended 300 feet.

The town of Dillon has shipped 100 tons of ore since Dec. 15th.

The gold output of Montana in 1897 is estimated at $4,500,000; silver output, coinage value, $21,000,000.

SOUTH DAKOTA.

Costello at Greenmont has a body of ore which assays $30.

The C. G. M. Co. of New York have decided to erect a smelter in the Hills in spring. The plant will have a capacity of 150 tons daily. H. Franklin of Deadwood will have charge of construction.

COLORADO.

The Commodore Co. at Creede have increased their output to 125 tons a day.

The Nelson tunnel, near Creede, is 4000 feet and making good headway.

Carver & Miller's shipments in the Amethyst at Creede this month will exceed that of any one for the last six months.

The Hanington at Amethyst continues to to ship 100 tons a day.

Gilpin county shows great gain in the production of gold for 1897.

Several large sales have also been made during the year of producing properties, among the list being the First Centennial for $127,500, the Topeka for $160,000, the Cook for $140,000, the Queen of the West for $20,000.

The shipments of mineral from Black Hawk station, commencing with December, '96, and ending with November, '97, were 3757 carloads—a gain of 914 carloads.

During the year the banks of Central City shipped gold to the amount of $727,000, showing a gain of $542,751.

The Idaho G. M. Co.'s property at Blue lakes has been purchased by a Montana company for $25,000. The new company has commenced work. Four giants will be used with a pressure of eighty pounds to the inch.

The Crown Point-Virginia mine at Idaho Springs is reported sold to Eastern capitalists for $150,000.

C. J. Moore has taken a bond on the Bird's Nest property at Eldora for $30,000.

M. D. Morrison has leased his Anaconda property to the Mayhem Investment Co.

The Virginia mine at Leadville is shipping twenty-five tons a day. The value is principally gold, silver and lead.

The first shipment of the Santa Rita main shaft, Cripple Creek, was made last week, consisting of ten tons.

The Fluorine is making daily shipments of from fifty to seventy-five tons of $25 to $30 ore.

The Magenta at Granite is down 260 feet and the George 190 feet. Fifteen stamps are crushing one ton to the stamp every twenty-four hours.

Pay ore has been struck in the lower workings of the Tom Boy at Telluride.

The Ibex Mining Co. at Leadville maintains an output approximating 400 tons per day.

Operations have been resumed on the Little Vinnie, Leadville.

The Mount Albert M. T. and P. Co. is driving a tunnel near Leadville. The bore is in 300 feet and has cut several veins showing bigh returns in gold. B. S. Phillips is conducting operations.

Cash & Harker are shipping large quantities of iron from the Jason at Leadville.

The production of the smelters of the Consolidated Kansas City Smelting and Refining Co. is given as follows:

The product of the works at Leadville, the Arkansas Valley Smelting Co., for the year 1897, amounts to:

	Ounces.
Silver	3,505,497.92
Gold	88,136.556
	Tons.
Lead	16,955
Copper	1,202

The derivation of this material was:

	—Ounces.—		—Tons.—	
	Silver.	*Gold.*	*Lead.*	*Cop'r.*
Colorado	3,064,602.63	87,947.311	7,990	1,192
Utah	55,187.07	181,792	157	10
Idaho	383,896 3s	.....	8,800	....
Colorado smelters	1,810.87	7,453	7	344

The '97 product of the Argentine plant (estimating the month of December) is:

Silver	11,408,623 ounces
Gold	227,991 ounces
Lead	45,033 tons
Blue vitriol	1,438,310 pounds
Litharge	2,553,861 pounds

The metals at Argentine derived from Colorado ores amounted to:

Silver	28,048.14 ounces
Gold	5,602,634 ounces
Lead	16,154 pounds
Copper	18 570 pounds

The State Bureau of Mines furnishes the following lists of men employed in the mines of Colorado, according to the various counties:

County—		*County—*	
Arapahoe	1,583	Lake	3,519
Archuleta	76	La Plata	544
Boulder	1,653	Larimer	147
Chaffee	707	Las Animas	26
Clear Creek	1,719	Mineral	495
Conejos	46	Montezuma	52
Costilla	28	Ouray	1,185
Custer	318	Park	467
Dolores	354	Pitkin	1,242
Douglas	77	Pueblo	1,685
Eagle	182	Rio Blanco	32
El Paso	5,386	Rio Grande	194
Fremont	384	Routt	247
Garfield	27	Saguache	264
Gilpin	2,473	San Juan	996
Grand	48	San Miguel	1,285
Gunnison	787	Summit	426
Hinsdale	493		
Huerfano	26	Total	29,219
Jefferson	45		

The above represents the average number of men engaged in mining in the various counties during the year 1897. It does not include the employes in the general offices, corporations, mining and consulting engineers, United States deputy surveyors, mining brokers and promoters, or those owning and operating properties, but giving their time to other vocations.

The following is a brief of the accidents and other causes, investigated by the Bureau of mines, for twelve months ending November 30, 1897:

Cause of Accidents—	*Fatal.*	*Non-fatal.*
Fall of earth and rock	23	43
Accidental discharge of blasting compounds	40	56
Material falling down shaft	9	9
Other shaft accidents	19	11
Persons falling down unprotected shafts, winzes and passes	9	5
Ladder accidents	1	8
Machinery accidents	1	11
Falls from staging	..	6
Accidents from other causes	8	20
Totals	110	169

The gold output of Colorado in 1897 is estimated from figures furnished by the smelters, mills and mint at $22,500,000, an increase of $6,000,000 over that of 1896. The silver produced was worth $12,807,076, lead $2,741,672, copper $1,209,053.

A company of Rico and Colorado Springs people is working the placer bars on the Dolores river on an extensive scale.

There are over eight miles of workings on the Newman group, Dolores Co., and vast territory remaining to prospect. Last week a good sized body of ore was encountered in new ground that returned 3½ ounces gold and 217 ounces silver per ton.

The Black Hawk M. Co. of Rico shipped eighty-eight cars of ore last year.

The Pay Roll mine at Rico has a vein carrying two and one-half ounces gold per ton and some lead ore.

The Victor-Golden Cycle pay roll at the mines was $45,000 for December.

The Blue Bird will output 200 tons this month. The larger part of the ore is valued at $30 per ton.

The Crawford had a two-carload shipment this week of $30 ore.

A shipment of twenty-three sacks of ore from the Granite at Cripple Creek was valued at $5000.

The Myers made its first shipment last week; it gave returns of $50 per ton.

The Six Points at Cripple Creek broke into a 4-foot ore body. A trial shipment made returned $142 per ton.

Ten inches of ore valued at from $400 to $600 per ton was uncovered in the Home Run mine last week at Cripple Creek.

MICHIGAN.

At Lake Superior it is expected that the Wolverine should earn $125,000 in '98, or $2 a share. The surplus of the Calumet & Hecla is but little short of $10,000,000 at present, although $5,000,000 was paid in dividends in '97, including the one paid Jan. 1, '98. The Tamarack mill is now turning out from 1350 to 1400 tons of mineral per month, which will average 71 per cent refined copper, nearly 2,000,000 pounds of copper monthly, as against two-thirds of that amount last year, and is earning, according to good authority, $11 per share. Dividends of $6 were paid in '97.

NEW MEXICO.

About forty-five miles southeast of Taos A. W. Tennant has six parallel veins two miles long in a width of 500 feet. The vein is 4½ feet wide at a depth of 340 feet. The ore runs 55 to 90 per cent copper. Hoisting works, pump, matte smelter and other improvements are to equip the property as soon as possible.

W. J. Cartan of the Cochiti G. M. Co. has closed negotiations for the purchase of the No Name group at Bland, and $10,000 will be spent in development at once.

The Blakslee tunnel at Elizabethtown is being equipped with air compressors and work will be pushed. The company will put in a concentrating plant. The tunnel is in 600 feet. When completed it will measure 4000 feet and give a depth of 2000 feet. It has followed a 4-foot vein the entire distance, the values of which range from $20 to $80 per ton.

A strike was made last week on the Zorn & Masterman, Elizabethtown, an inch streak in the vein showing quantities of free gold and giving returns of $5 per pound. Mgr. Gavin asserts that a plant for treating the product will be erected.

G. Young is taking out ore in Grant Co. which runs 18 per cent copper, $4 gold and six ounces silver per ton.

Brockman & Hughes, on the Hanover No. 2, have a body of 16 per cent copper ore.

Davidson & Bell, on the Golden Giant, near Silver City, have sunk 450 feet. There is a vein of gold ore in the shaft from the surface to the bottom.

On the old Hanover mine there is said to be more than 5000 tons of ore exposed, ready for stoping.

The Graphic, at Hadley, is to be reopened. J. L. Doran has taken a lease on the property for a year.

D. Wood has commenced work on the Eagle mine in Gold Hill.

The ore vein in the Western Belle is 14 inches wide and assays from $40 to $70 gold per ton.

The main adit level on the Confidence mine, in Grant Co., has attained 1600 feet, with a depth of 500 feet. Over 100 tons of ore per day is being shipped.

The old Spanish workings upon the Romero mine, near Silverton, recently reopened, were found in a perfect state of preservation after the lapse of nearly a century. There are hundreds of feet of drifts and crosscuts in solid rock, in the excavation of which not an ounce of powder was used, not a sign of a drill hole to be found in all the openings. The rock was broken by the primitive method of building fires against it and when at a red heat water was thrown upon it causing the rock to crack and disintegate. The expansion of the rock adjacent under the influence of heat caused it to loosen so that it could be extracted with picks and gads. These drifts are large—being about 8 feet square. In many places in these old workings good strata of pure nugget copper are exposed and a considerable area is thus explored and proven of value to work at a good profit with present improved facilities for working copper ores. The Guadaloupe continues to produce quantities of tenorite and melaconite.

ARIZONA.

On the Eureka, in the Globe district, the shaft is 300 feet deep, all the way in ore assaying fifteen ounces in silver.

The Pinto Creek M. & S. Co., at Pinto, is producing 47 per cent copper and $24 gold.

The Gypsie Queen, near Globe, shows 7 feet of ore carrying silver, lead and some gold.

Among a party of Eastern men expected in Jerome soon to see the working of that copper camp are C. M. Depew, J. N. Beckley, president of the Toronto, Hamilton & Buffalo Railway, of Rochester, N. Y.; E. Van Etten, general superintendent of the New York Central & Hudson River Railway, of New York City, and C. M. Warner of Syracuse, N. Y.

V. H. Igo has bonded the group of mines in the Huachucas for $10,000, stipulating the immediate commencement of work.

The Table Mountain Copper Co., at the new town of Klondyke, have 108 men at work. A smelter will be put up at once.

At the Norma mine, White Hills, a 3-foot ore body has been encountered on the 400-foot level, a car sample of which gave 2600 ounces of silver and over one ounce of gold per ton. The shaft is 30 feet in the ore body.

At the Independence, at Union Pass, the cross-cut tunnel is in ore which is said to run $100 to the ton. The ore body stands 200 feet above the ground, and is quarried. A mill of not less than 100 tons daily capacity will be erected immediately.

A 10-stamp mill is in operation on the Perris mine, near Congress. The Perris produces some high-grade ore.

The Nellis group of mines, Coconino county, has been purchased by Lombard, Goode & Co., of Chicago.

The shaft at the King of Arizona is 125 feet, and high-grade ore is being taken out.

A third interest in the Southern Cross was transferred to T. W. Briggs, who is developing the property.

The present work on the J. S. H., in Peralta canyon, is being done on ore of high grade.

On the Socorro, nine miles north of the Harqua Halas, the ore averages $9 in gold. The shaft is down 200 feet.

Eight miles south of the King of Arizona, assays from an area of several hundred feet square resulted in $20 to $40 per ton.

The Jerome Copper Co., developing properties adjacent to the United Verde, has struck a large body of copper ore. They expect to have a smelter in operation within the next six months.

T. Hamilton has given a bond on his property near Peeples Valley for $30,000. The ore in his main shaft runs $75 in gold.

A large body of ore has been struck in the Olden, near Phœnix.

T. Newland has given a bond for $20,000 on the North Star mine, Weaver district.

Denver *Republican*: Mining has been active during the year, mainly with gold properties. The product will be above the figures of last year. The Congress has increased its yield through richer ores secured at lower levels and through the operation of a cyanide plant. The United Verde, Clark's mine at Jerome, doubled its reducing capacity during '97, and its ores, commonly known as copper, carry large percentages of gold and silver. The pyritic districts immediately south of Prescott have about doubled their gold product of '96. In the south the Fortuna mine, near Yuma, has produced a third of a million. Its neighbor, King of Arizona, has had a product of about half as much in the few months of its existence. The Pearce mine, near Tombstone, has entered the ranks of heavy producers during the year, though its mill is not yet in operation, and its rich ores have been sent to El Paso for reduction. South of Tucson, in some of the oldest districts of Arizona, rich mines are being opened up on new ground. A considerable quantity of gold has come from the operation of a dozen or more large cyanide plants installed beside the dumps of the Vulture and other mines that were once great, and several hundred thousand dollars have come in through the placer operations on the Hassayampa and other gulches in southern Yavapai county.

Silver mining has declined until it is little more than a by-product. In Mohave county, however, reduction works are going into the silver belt about the White Hills. Hardly a silver mine has been worked during the year. The owners of the Reymert property, in Pinal county, express the general opinion when they state their inability to produce silver at a less price than 80 cents per ounce.

Copper production during the year has hardly held its own. The product of the Jerome smelter is in excess of '96, but no other copper furnace is running at present in northern Arizona. In the south the Bisbee Co., newly equipped with modern converters, is turning out an increased amount of high-grade black copper. At Clifton the Arizona Copper Co., from rich mines at the Morenci and Metcalf hills, has somewhat bettered its product of the previous year, but at Morenci the Detroit smelters have been shut down for half the year, pending improvements being made by the Bisbee Co., which recently assumed ownership through purchase from William Church of Denver. Globe, usually good for 20,000,000 pounds, shows not a pound for 1897. The furnaces closed down about the New Year past to await the advent of the railroad that stopped at Geronimo. But the bins at the Old Dominion and Globe Mines companies smelters are piled high with coke and the dumps are heaped with high value copper ore. New wire tramways have been put in between mines and smelters, and all is in readiness to "blow in" as soon as the railroad moves Globeward. The year has been utilized in doing development work, more development having been accomplished in the main mines about Globe than in five years before. The Grand Canyon railway will open up some copper mines that run in character of ores from free carbonates to base glance and sulphides and in metallic values up to 70 per cent.

MEXICO.

A Nogales dispatch says Marcus Daly of Montana, by his representative J. R. Toole, has purchased from F. C. Aguillar & Co., for $100,000, the Sultana mine, in Cerro del Oro, twenty-five miles east of Carbo, Sonora. Cerro del Oro district extends from Rayon to Horcasitas, on San Miguel river. Toole will employ 150 men in development work.

The Santa Rosalia shipped seventeen tons that brought $30,000. There are two more carloads on the way from Mexico. There is said to be 4 feet of ore in the shaft, which is past the 250-foot level. Good prospects have also been found in new ground.

The Esmeralda mine, near Minas Prietas, Sonora, has 1300 tons of ore on the dump which averages one ounce in gold to the ton.

Obituary.

Capt. Hall, Supt. of the Le Roi mine at Rossland, was killed in the mine last Wednesday morning. He fell from the surface to the 600-foot level. He had been making his daily inspection of the mine and coming to the surface stepped from the skip to a narrow beam dividing the double compartment shaft. He lost his footing and plunged down to death. Capt. Hall was a native of Ireland, aged 61 years. For seventeen years he was superintendent of the Alice mine, near Butte, Montana.

Recently Declared Mining Dividends.

Golden Star M. Co., Gold Mountain, Utah, $2500; Jan. 3.

Swansea, Utah, 5 cents a share, $5000; payable Jan. 10.

Recent California Mining Incorporations.

Alaska T., T. and M. Co., San Francisco; capital stock, $2,000,000; subscribed, $60,000; W. C. Gates, W. W. Phillips, C. P. Troy, W. H. Metson, M. J. Laymance, R. B. Mott, R. McKillican.

Commercial Paragraphs.

The Fulton Engineering and Shipbuilding Works of San Francisco have removed their offices to 15 First street.

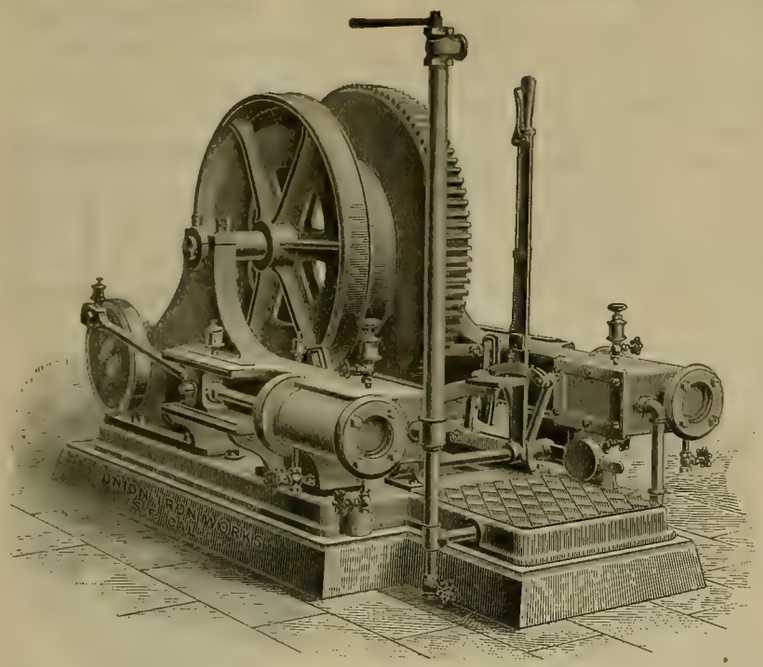
The Westinghouse Electric and Manufacturing Co. has declared a quarterly dividend of 1¾ per cent on the preferred stock of the company, payable Jan. 3rd, '98, to stockholders of record.

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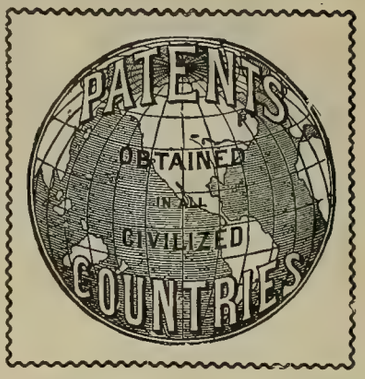
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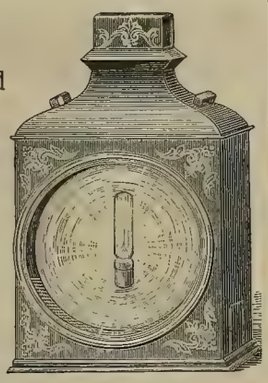
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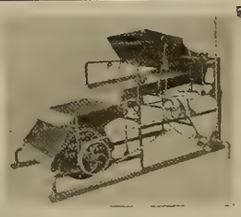
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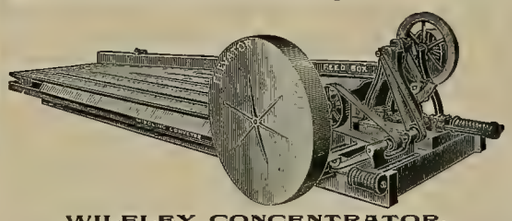
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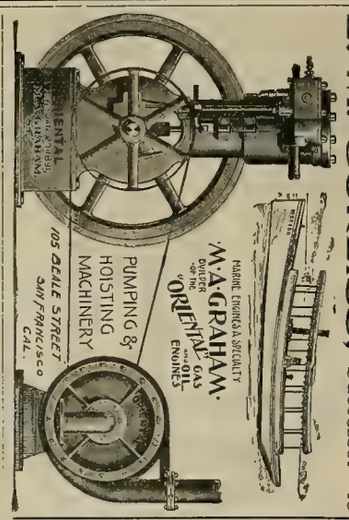
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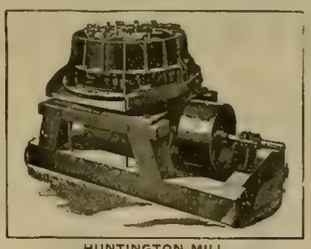
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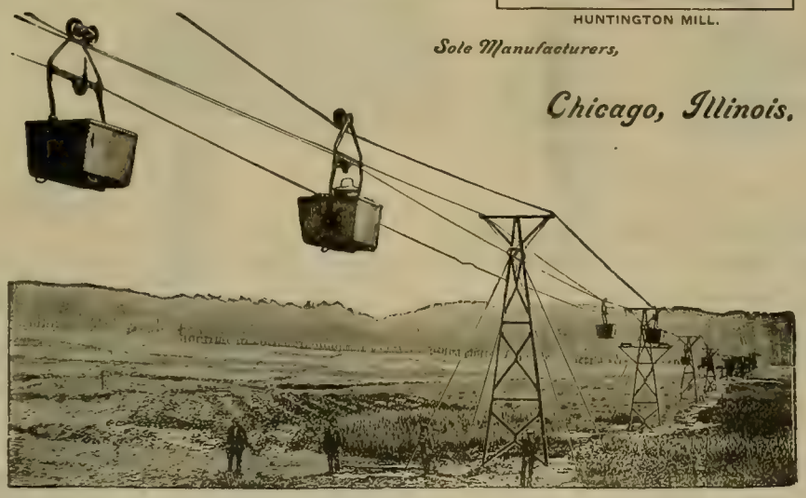
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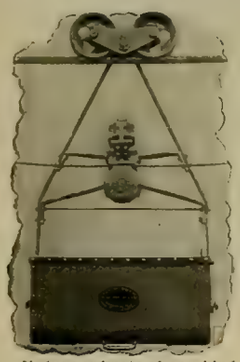
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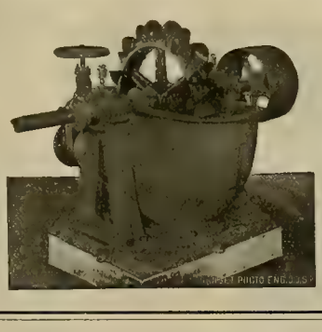
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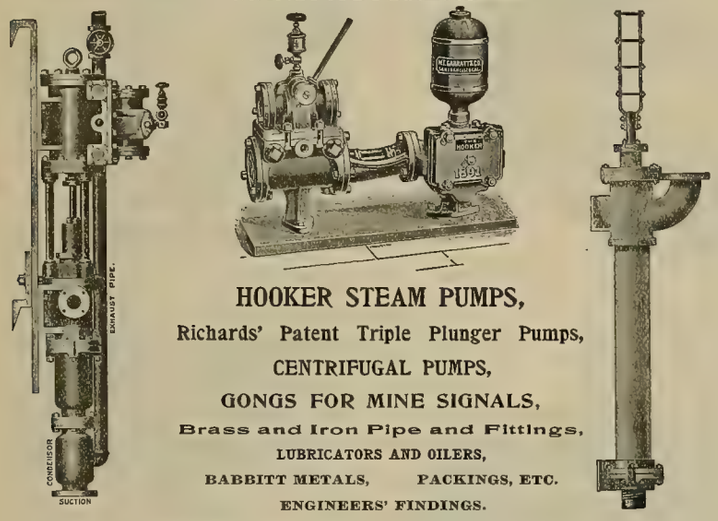
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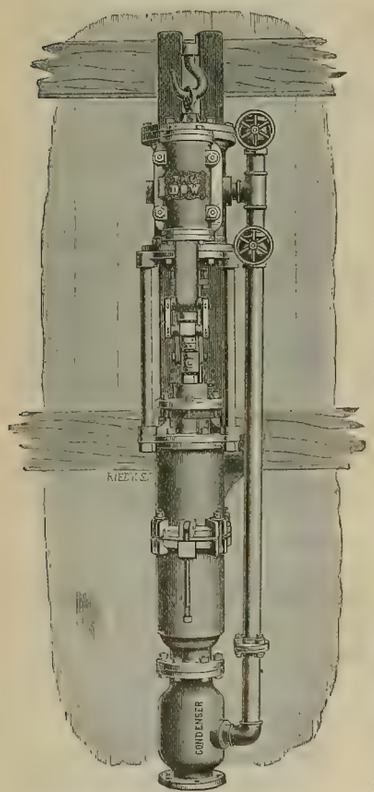
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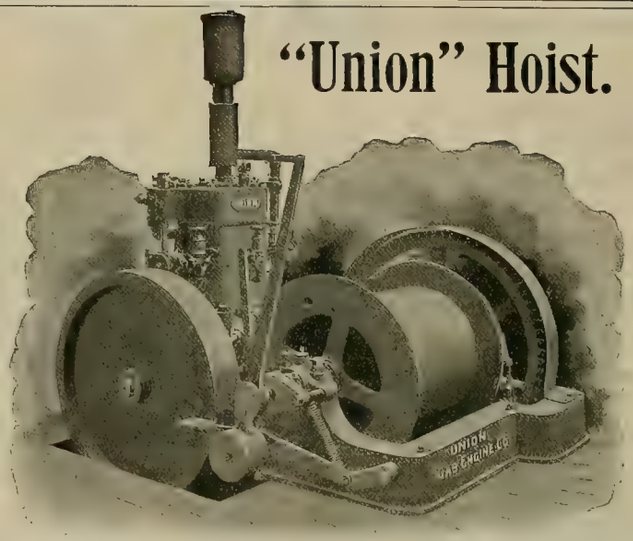
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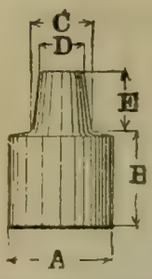
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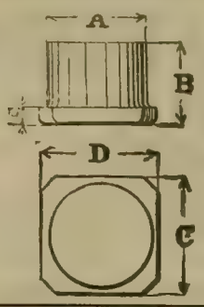
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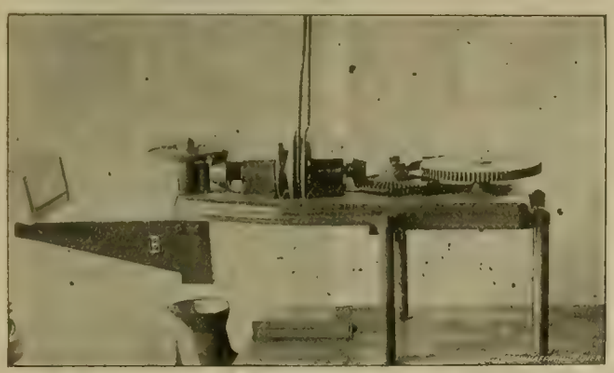
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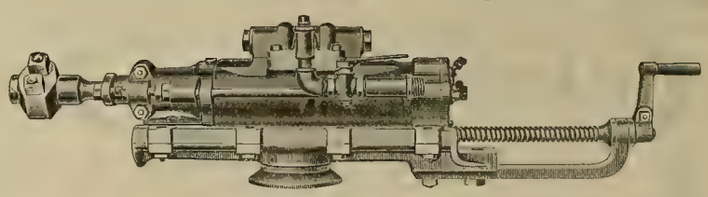
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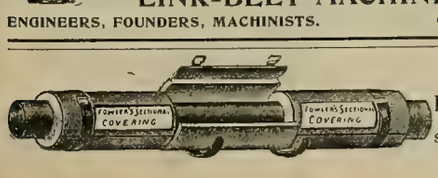
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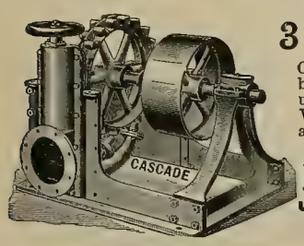
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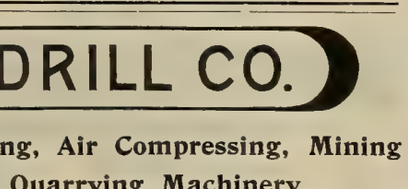
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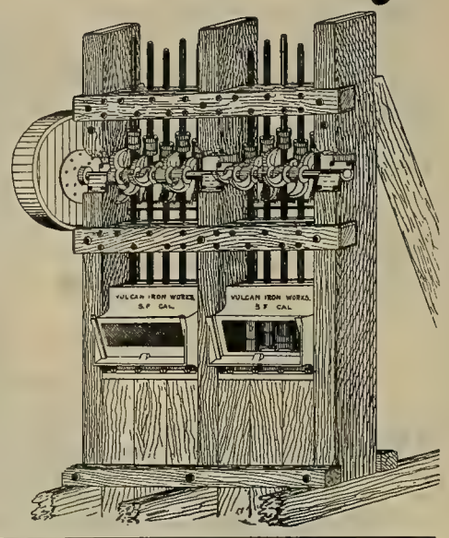
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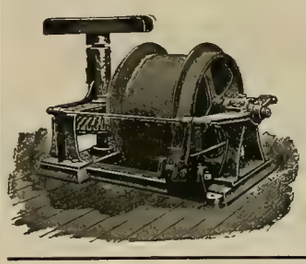
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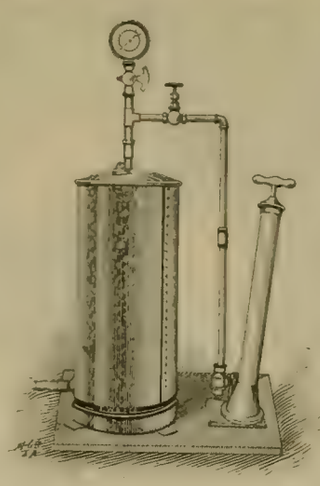
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Steel Water Pipe for Hydraulic Mining and Irrigation.

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Water Pipe for Placer, Hydraulic and Quartz Mining a Specialty. Made up complete, or cut, rolled and punched to be riveted at mine. Well Casing; Oil, Water and Cyanide Tanks; Galvanized Air Pipe; Ore Cars and Ore Buckets, and all kinds of Sheet Iron and Steel Work. Mail orders promptly attended to. Correspondence Solicited.

Market Reports.

The Markets.

SAN FRANCISCO, Jan. 6, 1898.

General trade has been good for the first week in the new year, which leads business men to look forward to even a more prosperous year than was 1897. About all the firms have taken account of stocks and striking a balance sheet for the year. So far as can be learned they are surprised at the increase in business and also the small loss by failures. There have been a few large failures but a very large falling off in small failures. It is the latter which hurts the most. Rains to-day have dispelled the feeling of gloom which began to set in, for if general and of several days continuance they assure large crops, particularly if we have the usual spring rains, and a supply of water for mining purposes through the summer months. All kinds of leather belting have been advanced in our market 15 per cent, by reducing the trade discount that much. At the East the advance is 25 per cent. Further advances are looked for if hides and leather continue to move up, which from present prospects looks as if they will go to still higher figures.

The local money market is easy. The savings banks, with the exception of one, have reduced the rate of interest allowed depositors; this indicates a lower rate of interest by them this year. These institutions are restricted by law in loaning money to certain kinds of securities, and the offerings of these are light, while the prices for desirable bonds are high. The commercial banks continue to report funds accumulating. This is but natural while the January disbursements are being made and no special demand for accommodation. On gilt edge security, low rates of interest can be secured, and also on the better class of commercial paper, but the latter is offering sparingly. The East reports the markets easing under heavy disbursements. It is expected that before two weeks the markets there will have assumed their normal condition, and funds be secured at lower rates of discount. It is confidently predicted that speculation will revive on the stock exchanges, which will call for more funds.

New York Silver Prices.

NEW YORK, Jan. 6.—Following are the closing prices for the week:

	Silver in— London.	N. Y.
Friday	26⅝	57¼
Saturday	....	....
Monday	26 9-16	56¾
Tuesday	26¾	55⅞
Wednesday	26 3-16	55⅝
Thursday	26¾	56⅞

	Copper.	Lead.	Iron.	Tin.
Fri.	10 90 @11 00	3 72½	10 00@12 25	13 70
Sat.	....	....	....@....	....
Mon.	10 90 @11 00	3 72½	10 00@12 25	13 75
Tue.	10 90 @11 00	3 70	10 00@12 25	13 75
Wed.	10 90 @11 00	3 70	10 00@12 25	13 77½
Thur.	10 90 @11 00	3 70	10 00@12 25	13 77½

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.82¾
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	55%
Mexican Dollars nominal	47@—

SILVER.—The market has fluctuated to lower prices at home and abroad. As usual to the holidays the demand abroad is quiet. It is expected that improved call will set in soon, but on what this opinion is based it is hard to say, unless it is that the difficulties in China will subside and that country require more silver. India, it is expected, will continue to be a purchaser until the crops have been marketed.

MEXICAN DOLLARS.—The demand is slow. Exporting is falling off.

COPPER.—The market at the East continues remarkably steady, considering the engineers' strike abroad is still on. The outlook for 1898 is favorable for an increased consumption in this country and abroad on that of 1897.

Our market is quoted as follows:

Ingot casting, jobbing	13 @—
Ingot " wholesale	12½@—
Sheet copper	— @16¼
Bolt	¼ and 5-16, 20c; ⅜ and larger, 16¼

TIN.—There is nothing new to report. The market is steadier for pig, but the demand is, as yet, slow here; but it is improving at the East for to arrive and shipment.

The market is quoted in jobbing lots as follows:

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, "	4 00@—

QUICKSILVER.—The market holds steady. The demand is slow.

Our market is quoted at $39 for domestic consumption and $35@36 for export to the west coast of Mexico.

LEAD.—The market is easier for pig, both here and at the East.

Our market is quoted in jobbing lots as follows per 100 pounds:

Pig	4 75	@	5 00
Sheet	6 30	@	6 80
Pipe	5 60	@	6 10

SHOT.—The market is easier.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 40
Drop, B and larger sizes, " "	1 65
Buck, Balls and Chilled, do, " "	1 65

IRON.—The spot market is unchanged. Imports the past week aggregate 120 tons from Liverpool. The consumption at the East is the largest in the history of the country. A private circular reports: "The total imports of pig iron have been 10,421 tons—3505 tons from England, the balance was Eastern. Prices this year were the lowest on record, and it is singular that any foreign can be imported unless at a loss, having $4 per ton duty to pay, and its original cost is higher than American. Only 198 tons of foreign scrap iron were imported; there were 1116 tons received here last year. In 1892, 11,113 tons were received. The low price of pig iron causes the shrinkage in consumption."

NAILS.—The market is firm.

We quote the following basis: 20d to 60d, inclusive—wire $2.60, cut $2.50.

	To Arrive.	Spot.
AMERICAN.		
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50
ENGLISH.		
Barrow	$21 00	$33 00
Gartsherrie	21 50	23 00

COAL.—The market is steady to firm. From the annual report of J. W. Harrison we excerpt the following:

"The fuel consumption of California this year (1897) is about 7 per cent greater than in 1896, which evidences that the outgoing year has been a fairly profitable one for some of our manufacturing branches. Coal freights from Australia and Great Britain have ruled high for several months past, thus aiding to sustain full figures, as our coast colliery managers regulate their scale of prices by the import cost of colonial and English. Hence this year has proved a very profitable one for our northern coal fields. It is a query how the local coal market will shape itself in 1898. There is no doubt as to the ability of British Columbia and Washington to fully supply us with all the fuel we may need, in case foreign shipments should diminish, but the earmarks are visible of probable labor troubles when the Klondike exodus commences, and the writer predicts that all grades of laborers will catch the fever. Even if no trouble emanates from that source, there will certainly be a sparsity of vessels for transporting coal, as they will assuredly drift into the more profitable business of carrying freight and passengers towards the Alaska gold fields."

The following table of prices will show the monthly fluctuations of foreign coals for spot cargoes—the average price as given for each month:

	Australian (Gas).	English Steam.	Scotch Splint.	West Hartley.
January	$5.25	$6.35	$6.50	$7.00
February	5.25	6.25	6.50	7.00
March	5.15	6.25	6.25	6.75
April	5.10	6.00	6.25	6.75
May	5.15	6.25	6.25	6.75
June	5.20	6.25	6.25	7.00
July	5.25	6.25	6.50	7.00
August	5.50	6.50	6.75	7.25
September	5.75	6.75	7.00	7.25
October	6.00	6.75	7.00	7.25
November	6.10	6.75	7.00	7.25
December	6.10	6.75	7.00	7.25

The various sources from which we have derived our supplies are as follows:

	1894 Tons.	1895 Tons.	1896 Tons.	1897 Tons.
British Columbia	647,110	654,295	551,852	558,372
Australia	211,733	268,960	273,851	281,466
English & Welsh	157,562	201,180	156,368	107,969
Scotch	18,636	4,098	8,356	4,081
Eastern (Cumberland and Anthracite)	16,640	26,863	17,907	21,335
Seattle (Franklin, Green River, etc.)	153,199	150,888	128,919	220,175
Carbon Hill, So. Prairie, etc	241,974	256,267	255,903	286,205
Mt. Diablo and Coos Bay	65,263	84,954	110,237	115,150
Japan, Alaska, etc.	15,637	9,015	2,247	6,587
Total	1,527,754	1,653,520	1,505,660	1,601,540

COKE.—The total receipts in 1897 aggregated 30,320 tons, 5812 tons less than in 1896, 2573 tons of which came from British Columbia and 1889 tons from Australia. These are two new sources of supply for this market.

PLATINUM.—The market is steady.

Our market is quoted in a jobbing way at $15 per ounce and for scrap $10 an ounce.

BORAX.—The market is firm with a good demand ruling.

The market is quoted as follows:

Refined, in carload lots, in barrels	6
Refined, in carload lots in sacks	5¾
Powdered, in car lots	6¼
Concentrated, "	5½

ZINC.—The market is firm.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 45 to 50 cents per pound for ingots.

ANTIMONY.—The market is steady.

POWDER.—The market is firm at current quotations.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9 to 11c, according to strength and quantity.

Chemicals.

There is absolutely nothing new to report, but it is expected that before the current month passes there will be a stiffening in some and a more active demand from jobbers, whose stocks have run down. New York mail advices do not report anything new since our last week's issue.

CYANIDE OF POTASSIUM.—The market is steady.

Our market is quoted for chemical pure 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The demand is quiet.

We quote in a jobbing way at 1¾c per lb for 66%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported firm from store at 6½@7c per pound in carboys.

BONEASH.—There is a slow demand.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady.

We quote in a jobbing way at 4c per pound.

SPELTER.—The market is steady.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is firmer.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steadier at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—The market is quiet, with a firmer tone.

Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

Mining Share Market.

SAN FRANCISCO, Jan. 6, 1898.

The market held firm at steady prices last Friday, and Monday morning, but in the afternoon it began to show signs of being top-heavy, which brought in the nimble chippers who began to sell. On Tuesday the feeling was weaker with some outsiders taking their profits and the chippers still selling, which resulted in quite a shading in prices yesterday. While this decline may be a surprise to some yet the points put out last week show that the manipulator engineered it by standing from under the market and let bear chippers beat it down. If the points put out are to be carried out now Con. Virginia ought to sell for less money, about $1 a share. It is only by false upmove that the outside can be made to unload, for everything points to the inside wanting more shares notwithstanding their large pool holding. It is quite possible that the more desirable shares are still held too largely by the outside and the market is worked so as to disgust holders into selling. To do this successfully more assessments will be levied—for shares they are after and shares they will have. The general condition of the country, with speculation reviving everywhere and interests at home and abroad centered on this coast, it is not likely that the moneyed inside will miss the opportunity of making a deal the coming spring, but while it is under way, low, sick and dragging spells must be looked for. It is only by doing this that the public can be relieved of their holdings, but when the time comes to sell to the public then the tactics are changed. The news from the mines is of rather an encouraging character. The work in several is of an assuring nature, for it gives promise of ore strikes within the next few weeks, providing the mining share manipulator does not have it intimated to superintendents that it is not desirable, or if one is made hush it up and either stop work or else change the work so as not to show it up. Time alone will solve it.

The news from the Comstock mines through officially filed letters does not indicate anything of special interest, but private advices point to more activity at several points. It is stated that the preliminary or dead work has been finished in some mines and is nearing the end in others. Active exploiting will be the order soon with some, the direction generally toward points where there is a reasonable assurance of finding ore. It has been the history of about all the mines on the Comstock to have reports made in such a way as to mystify the public. In Utah they are still going in a northwestern direction. At last advices they were in vein matter. The distance run is nearly 350 feet. In Sierra Nevada there appears to be a firmer conviction than ever that when they strike the ore, which will probably not be until in February unless they make faster progress, it will show quite an improvement. The official letter filed last week reported slow work owing to making repairs. In Union work, so far as officially advised, is confined to running east on the 900-foot level. They are running east on the 1000-foot level of Mexican. Judging from the work reported it seems safe to affirm that something has been found and that they are blocking out the ground in Mexican and Union. The blocking out is often done to kill time and also get outsiders to sell shares by the old freeze-out process of levying assessment; but in this case the work may be an exception. They continue to go west in Ophir on both the old Central tunnel level and 1000-foot level. In the latter crossdrift the formation was favorable. In Con. Virginia active work is continued on the 1550-foot, 1650-foot and 1750-foot levels. In the bottom of the north drift, ran from an upraise from the 1650-foot level, a streak of $50 ore was struck. This may encourage them to prospect the streak to see what it may develop into. Nothing comes from Best & Belcher. In Gould & Curry no work has been done the past two weeks. In Savage they are going west from the 500-foot level. They are in about 145 feet. On the 130-foot level they are cleaning out and repairing an old west drift. No work in Hale & Norcross.

In Chollar more active work ought to be the order soon. In Potosi they are getting ready for more important work. The Bullion-Potosi drift is being driven ahead to connect with the Crœsus shaft. In Alpha blocking out work is the order. The work in the mine indicates they are getting ready for more active and important work. It may be they intend to develop the gold ore found to the west and quietly ignored since. There is no change in the Con. Imperial work, neither is there in Confidence. From Yellow Jacket nothing new comes to hand. Only one shift is worked. From the nature of the work in Belcher and Crown Point, it looks very much as if the management does not want to make an ore strike, although the work is being prosecuted with a fair degree of energy. No change reported in the official letters. From Seg. Belcher and Overman nothing new is at hand. In Alta they are getting ready to stope. The expected ore strike in Justice has not materialized; it is, like the pot of gold at the end of the rainbow, just ahead. Rainbow chasing is good for miners, as it gains them work, but the showing in Justice does justify more exploiting.

From the Brunswick lode our advices indicate that the companies that have not commenced going west will do so, as recommended in the recent report. From all we can learn it looks as if this is the right direction for striking a fair to good-sized body of paying ore. It will not be long before the result will be known—say from three to six weeks. In the 600-foot level the west crossdrift run jointly by Best & Belcher and Con. Virginia is in about 60 feet, and the west crossdrift in Gould & Curry is in over 90 feet. The latter shows quartz and porphyry. In Savage they are still going north, and were at last advices in quartz giving low assays. Joint work to the west is being done on the 500-level by Chollar and Potosi. There is no change in the work on the 600-foot level. Active exploiting work, with no change reported, is being done on the 550-foot, 650-foot and 750-foot levels of Occidental.

The following illustrates the changes of the week:

Mines.	Dec. 30.	Jan. 6.
Alpha	....	....
Alta Consolidated	$ 05	$ 12
Andes	....	15
Belcher	....	43
Best & Belcher	....	50
Bodie	....	....
Bullion	....	....
Challenge	....	24
Chollar	36	....
Confidence	....	....
Consolidated California and Virginia	1 30	1 25
Consolidated New York	....	....
Crown Point	....	25
Exchequer	....	....
Gould & Curry	43	38
Hale & Norcross	1 65	....
Justice	....	....
Mexican	....	....
Ophir	65	60
Overman	....	....
Potosi	41	32
Savage	....	18
Sierra Nevada	72	....
Union	....	35
Utah	....	09
Yellow Jacket	....	35

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 6, 1897.

9:30 A. M. SESSION.

100 Andes	14	150 Gould & Curry	38
300 Belcher	43	200 N G & C	25
450 Best & Belcher	50	100 Ophir	60
100 Con Cal & Va	1 25		

SECOND SESSION—2:30 P. M.

100 Gould & Curry	36	300 Utah	09
700 Con Cal & Va	1 25	300 Union	35
100 Savage	18	300 Alta	12
300 Crown Point	25	100 Potosi	32
700 Yellow Jacket	35	200 Challenge	24
300 Belcher	39	100 Andes	15

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	58	10c	Dec 3	Jan 7 Jan 28	J E Jacobus, 309 Montgomery
Belcher S M Co, Nev	57	20c	Nov 20	Dec 24 Jan 14	C L Perkins, Mills Building
Bullion M Co, Nev	51	5c	Dec 17	Jan 21 Feb 12	R R Grayson, 331 Pine
Challenge Con M Co, Nev	24	10c	Dec 16	Jan 19 Feb 9	C L McCoy, Mills Building
Hale & Norcross S M Co, Nev	11	10c	Mar 20	Dec 28 Jan 18	R R Grayson, 331 Pine
Marguerite G M & M Co, Cal	8	10c	Nov 4	Dec 13 Jan 15	F Mettmann, 237 Twelfth
Marina Marsicano G M Co, Cal	12	9c	Jan 3	Feb 7 Feb 28	Chas Bovone, 217 Sacramento
Mexican G & S M Co, Nev	58	15c	Jan 6	Feb 10 Mar 3	Chas E. Elliot, 309 Montgomery
Occidental Con M Co, Nev	29	10c	Dec 7	Jan 11 Feb 1	A K Durbrow, 309 Montgomery
Overman S M Co, Nev	78	5c	Nov 17	Dec 22 Jan 12	G D Edwards, 414 California
Red Cap M Co, Cal	2	$5	Nov 29	Jan 6 Jan 29	H H Martin, 125 Beale
Savage M Co, Nev	94	20c	Jan 6	Feb 8 Feb 28	E B Holmes, 309 Montgomery
Union Con S M Co, Nev	55	15c	Dec 6	Jan 11 Jan 31	A P Swain, 309 Montgomery
Utah Con S M Co, Nev	26	5c	Dec 2	Jan 6 Jan 24	A W Havens, 309 Montgomery

WILL NEGOTIATE with owners or their duly authorized agents only.

WILL INVESTIGATE only thoroughly bona-fide properties, either Mines, Prospects or Mineral Lands, whose owners are willing to make reasonable terms. When sending reports on properties also send terms on which you are willing to sell or lease.

E. N. BREITUNG,
Marquette, Mich., U. S. A.
Operator and Dealer in
Mines, Mining Properties and Mineral Lands,
Mining Stocks, Bonds, Options, Leases, Contracts and Securities.

MONEY LOANED ON BONA-FIDE MINES

WILL EXAMINE on reasonable terms all kinds of Mines, Mining Properties and Mineral Lands as to their value, method of working and the condition of their titles.

WILL GIVE Options, Leases, Bonds and Contracts on all kinds of Mines, Mining Properties and Mineral Lands.

Assay and Chemical Work Done on Reasonable Terms.

Have best of bank and other references. Use McNeill's or A B C Telegraphic Codes.

DO ALL OUR OWN EXPERT AND CHEMICAL WORK.

Working Capital for Mines.

PACIFIC EXPLORATION COMPANY

Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 29-30 Chronicle Building, S. F.

Rainfall and Temperature.

The following data for the week ending 5 A. M., January 5, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week....	Total Seasonal Rainfall to Date....	Total Seasonal Rainfall Last Year to Same Date....	Average Seasonal Rainfall to Date.	Minimum Temperature for the Week.	Maximum Temperature for the Week.
Eureka	00	....	22 15	17 89	36	64
Red Bluff	00	6 06	11 46	11 14	32	68
Sacramento	00	....				
San Francisco	00	4 07	11 10	9 65	44	63
Fresno	00	1 99	4 11	4 12	38	64
San Luis Obispo	00	1 58	7 74		30	82
Los Angeles	00	2 56	5 11	6 68	46	88
San Diego	34	1 75	4 26	3 55	50	80
Yuma	04	0 80	1 98	1 78	42	76

A Land Without Life.

The west coast of South America from north of Callao, Peru, to the port of Coquimbo, Chile, is a rainless region. From the Andes to the Pacific no rain falls, and no vegetation or animal life exists beyond what man brings there. It is a dead world. The last rain which fell in Antofogasta, Chile, was the first that had fallen in sixteen years, and the last shower in Iquique, Chili, was the first rain which had fallen in twenty-four years. The hills or mountains back of both these cities are bare rock and sand and red loose clay, yet the day after the rain a greenish tinge began to show itself and by the second day these bare and inhospitable hills were dressed in a green coat from top to bottom. As no more rain fell, this verdure quickly dried up and died. The query rises naturally, whence did this vegetation come? If from seeds lying dormant in the soil, then once sprouting would finish this source, and the short life of this plant gives no opportunity for the development of seed.

Every succeeding time when rain falls in these regions in periods of from fifteen to forty years the same phenomena occur. The growth evidently springs from some root which lies dormant in the soil, and is rather remarkable proof of the powers of nature to adapt life to hard conditions, as there is no evidence that for several million years past there have been any more favorable conditions for life on this coast than exist now. No evidence exists that at any time vegetable life has existed in all this region, and until the course of the winds changes all this region is destined to remain, as it is to-day, a barren desert.

The Mineral Land Bill.

A Washington dispatch says that when the Public Land Committee of the House meets next, one of the first matters to be laid before it will be the report of the Secretary of the Interior upon the California mineral lands bill. Congressman de Vries sent the bill to the department recently and it was turned over to Commissioner Hermann, who has a report in preparation. That it will be favorable is indicated by the fact that Hermann has within a week declared himself in favor of the legislation and practically promised to recommend the passage of the bill. Every member of the delegation is believed to be behind the bill, and a strong effort will be made to have it brought up soon, should it be reported favorably from the committee, as now seems certain.

Colorado's Gold Fields, Illustrated.

Just out, with correct map and nearly 100 mining views natural as life. This valuable book will be sent free, prepaid, with our big 56-col. family paper 3 months on trial for 25c; club of 5 and 5 books $1. Latest mining news. Mention THE PRESS and address *Illustrated Weekly Sentinel*, Denver, Colo. Cripple Creek is fully described.

COMPLETE MINERAL CATALOGUE.

186 pages, with 40 engravings. Contains a table giving name, composition and form of all known minerals, with a supplement bringing the work up to date; a new metallic classification, showing what minerals contain each element; alphabetical index of names; lists giving the specimen values of minerals, etc., etc. For the use of students, prospectors, mining experts, chemists and others. *Prices, postpaid: Paper bound, 25 cents; Cloth, 50 cents; Calf, interleaved, $1.* **Published by DR. A. E. FOOTE, Mineral Specimens; Sets of Ores for Reference, etc., etc. Price Lists Free. 1317 Arch Street, Philadelphia, Pa., U. S. A. Established 1876.**

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING DEC. 28, 1897.

596,119.—INSULATING MATERIAL—Borrowe & Lumley, S. F.

596,362.—RAISIN SEEDER—C. S. Cox, Fresno, Cal.

596,146.—ALARM CLOCK.—W. Dupen Whatcom, Wash.

596,105.—RAIL JOINT—F. Erdmann, S. F.

596,110.—ROCK DRILL—J. K. Firth, S. F.

596,101.—OVERHEAD SWITCH—D. Gaul, Los Angeles, Cal.

596,324.—SMOKELESS POWDER—F. A. Halsey, San Rafael, Cal.

596,156.—BADGE, ETC.—J. Hansen, Everett, Wash.

596,095.—EJECTOR FOR ASHES—F. H. Heath, Tacoma, Wash.

596,327.—FOLDING GATE—Henning & Schmid, S. F.

596,146.—COMBINED HARVESTER—B. Holt, Stockton, Cal.

596,210.—BICYCLE SUPPORT—F. Johnson, S. F.

596,329.—STREET SWEEPER—T. R. Jones, Sacramento, Cal.

596,113.—BEVEL GAGE—L. Manning, Clarksville, Cal.

596,114.—WHEEL RUNNER—J. McNaughton, Ruby Hill, Nev.

596,415.—AMALGAMATOR—W. Notley, Los Angeles, Cal.

596,178.—PROPELLER MECHANISM—E. E. Onlevey, Sacramento, Cal.

596,179.—STEERING APPARATUS.—E. E. Onlevey, Sacramento, Cal.

596,124.—WAVE MOTOR—Pyle & McDonald, Simi, Cal.

596,218.—FREIGHT VESSEL—C. Salmond, S. F.

596,219.—STAMP WALLET—A. Schneider, San Diego, Cal.

596,221.—FLOWER HOLDER—Jennie L. Sturtevant, Gilroy, Cal.

596,343.—FRUIT PITTER, ETC.—T. M. Topp, Sacramento, Cal.

596,191.—REGULATOR—H. H. Tracy, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FOLDING GATE.—James H. Henning and John E. Schmid, San Francisco Cal. No. 596,327. Dated Dec. 28, 1897. This invention relates to an improvement in gates of that class which are composed of essentially vertical bars or members and which are designed to open and close horizontally. The object of the invention is to so construct the gate as to make the openings when it is extended as small as possible, and to provide for a great rigidity to resist torsional strain. It consists of vertical bars made T-shaped in transverse section, having slots made through the central leg, diagonally disposed bars crossing each other and pivoted in the slots, said bars having a reverse curve made upon each side of the pivot point, so that the upper and lower portions are thrown out of line with each other to fold against the opposite sides of the central leg of the main bars, and thus allow the whole gate to be closed up into very small compass. Between the main bars are intermediate ones with which the upper end of two of the adjacent diagonal bars are pivoted. Slides are fitted to clasp these bars, and with these slides the downwardly extending arms of the correspondingly adjacent pairs of diagonal bars are pivoted so that the upward movement of the bars and the downward movements of the slides allow the parts to be closed together, latches project from the central vertical bars and brace bars are so hinged as to press against opposite sides of the vertical bars and engage with the latches. The bottom lower ends of the gate sections are provided with rollers, and these travel in a channel iron guide which lies upon the floor for the purpose and may be folded up against the edge of the gate and locked thereto when the gate is folded.

FRUIT CUTTING AND PITTING MACHINE.—Thos. M. Topp, Sacramento, Cal. No. 596,343. Dated Dec. 28, 1897. This invention relates to a device which is especially designed for removing pits from fruits, such as apricots and peaches. It consists essentially of a pair of circular disks, mounted to rotate with their peripheral edges meeting in a single plane, concavities or depressions formed in each of the cutters having holding points within the depressions and registering so as to seize and hold the fruit pit when the cut takes place. Hinged arms have cups mounted at the outer end adapted to grasp the fruit and hold it in line with the edges of the cutter, and shafts or pins carrying the cups are mounted upon arms, while the machine has fixed lugs upon it with which these arms contact, so that the cups are turned on their axes and the twisting movement given to the fruit after it has been cut, which acts to release it from the pit.

SMOKELESS POWDER.—Francis A Halsey, San Rafael, Cal. No. 596,324. Dated Dec. 28, 1897. This invention relates to improvements in the manufacture of explosive compounds, and especially of that class known as smokeless gunpowder. It consists essentially in the combination or alkaline metal and earth metal salts and ammonium picrate in such a manner and such proportions as to produce the desired results.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from B. Frecoero, in the Frazer and Swank Gravel mine at Washington Ranch, Calaveras Co., to deposit tailings in an old pit; from Manuel Silva and Joseph Enos, in the Cherokee Flat mine at Cherokee, Butte Co., to deposit tailings on a flat below the mine; from J. Lagomasino, in the Grizzly Bear Placer mine near Johnsville, Plumas Co., to deposit tailings in Squirrel creek; from Paul Zerga et als., in the Last Chance Placer mine near Sierra City, Sierra Co., to deposit tailings on a flat below the mine; from T. T. Kirkham, in the Mt. Vernon mine near Nevada City, Nevada Co., to deposit tailings in Mt. Vernon ravine; from William Ross, in the Clark mine near Dieta, Amador Co., to deposit tailings in Deadman's creek; from Chas. E. Wise, in the White Oak mine near Colfax, Placer Co., to deposit tailings in Live Oak ravine; from John Solari and Joe Devencenzi, in the Red Gulch and Mahala Flat Hill mines near Volcano, Amador Co., to deposit tailings in a ravine below the mines; from J. F. and M. H. Goodman, in the Bicknell mine near Volcano, Amador Co., to deposit tailings in the North Branch of Sutter creek; and from S. R. Hackley, in the Indiana and Gold Bug mine near Omo Ranch, El Dorado Co., to deposit tailings in Perry's creek, gives notice that a meeting will be held at Room 69, Flood Building, San Francisco, Cal., on January 17, 1898, at 1:30 p. m.

M. CRAFFEY,
Manufacturer of the Celebrated
Smelter Broom,
1554 BLAKE ST.....DENVER, COLO.

Lunkenheimer's "Handy" Gate and "Lever Throttle" Valves



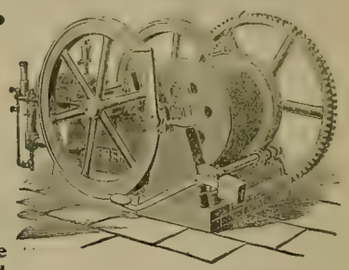
"HANDY."

Are unequaled in places where a quick-acting valve is required. The "Handy" for 75 lbs. pressure and the "Lever Throttle" for 175 lbs. The "Handy" is made in sizes ranging from ½" to 4" in brass; 2" to 8" in iron, brass mounted; 1" to 8" in all iron. The "Lever Throttle" in brass from ½" to 4;" in iron, brass mounted, 2" to 8"; in all iron, 1" to 8". Both styles in screwed ends only. Simple, practical, and low-priced. Specify Lunkenheimer's "Handy" or "Lever Throttle" and get the best. Supplied by dealers. Catalogue free for the asking.


"LEVER THROTTLE."

THE LUNKENHEIMER CO., Cincinnati, Ohio, U. S. A.,
SOLE MANUFACTURERS,
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Weber GASOLINE HOISTING ENGINE.



MONEY SAVERS.

Costs to run One Cent per Horse Power per Hour. No Coal or Wood and very little water required.

This cut represents our 10, 15, 20, 30, 40, 50 H. P. Geared Hoist.

Hoisting for 32 Cents Per Day.

SAN PEDRO, N. M., April 23, 1897.

WEBER GAS & GASOLINE ENGINE CO.,
KANSAS CITY, MO.

GENTLEMEN—Yours of the 14th at hand. The 10 H. P. "Weber" Gasoline Engine Hoist we got is "out of sight," and the longer we run it, the better we like it. We are now down with our shaft in the neighborhood of 175 feet. We only work one shift. All it costs us for gasoline is 32 cents per day. It takes us from three to four hours a day to do our hoisting. Yours truly, J. T. MCLAUGHLIN.

WEBER GAS AND GASOLINE ENGINE CO.,
430 S. W. Boulevard,.....KANSAS CITY, MO.

WEST COAST OF MEXICO.

WÖHLER, BARTNING & CO., Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

Assessment Notices.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of December, 1897, an assessment (No. 29) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of January, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 3rd day of January, 1898, an assessment (No. 12) of 9 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1898, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

THE SAVAGE MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 6th day of January, 1898, an assessment (No. 94) of 20 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

THE ROESSLER & HASSLACHER CHEMICAL CO.
100 William Street, New York.



Trade Mark.

CYANIDE

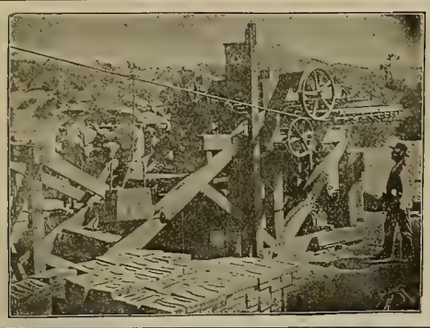
Peroxide of Sodium

Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And other Chemicals for Mining Purposes.



THE HALLIDIE ROPEWAY

Stands pre-eminent for the transportation of Ore, Fuel and other materials over mountainous and rugged country.

Parties desiring to remove large quantities of Sand, Gravel, Earth, Ore, Rock, to construct Dams, Levees or Embankments, etc., can do most efficient work at less cost by the

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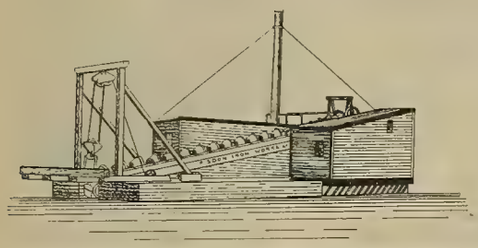
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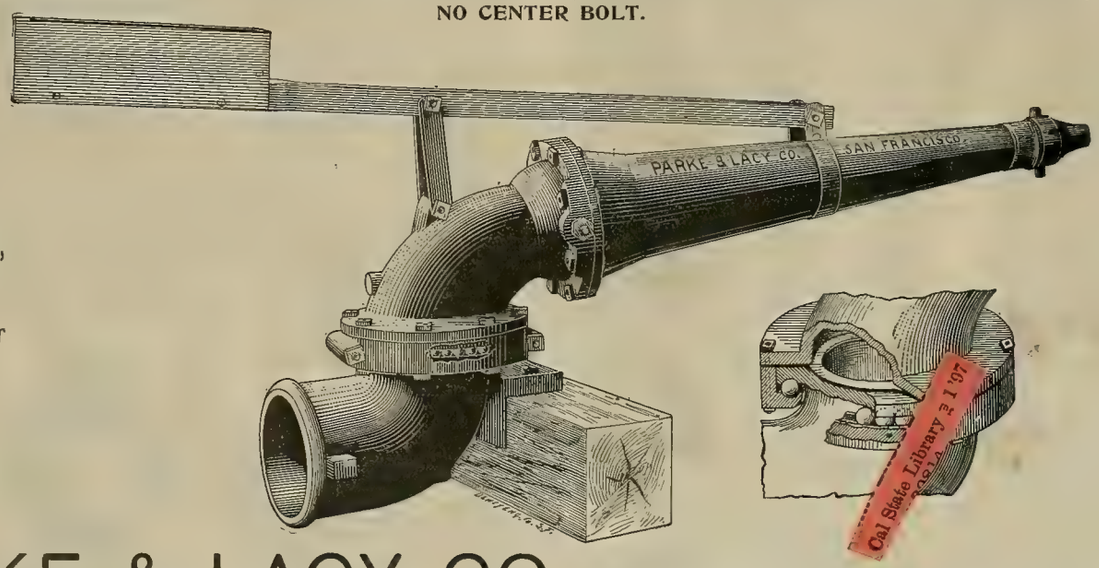
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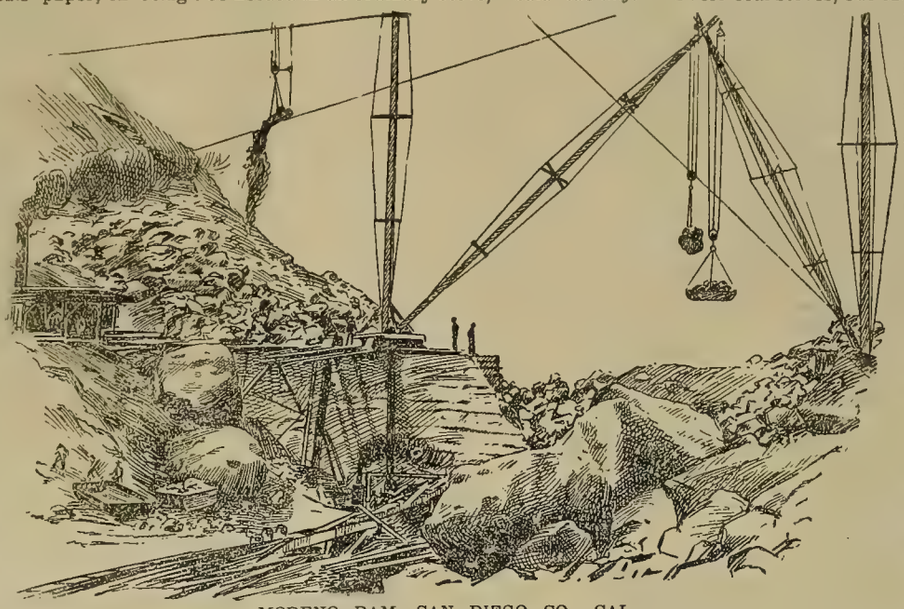
MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1958.—VOLUME LXXVI. Number 3. SAN FRANCISCO, SATURDAY, JANUARY 15, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Cooking by Electricity.

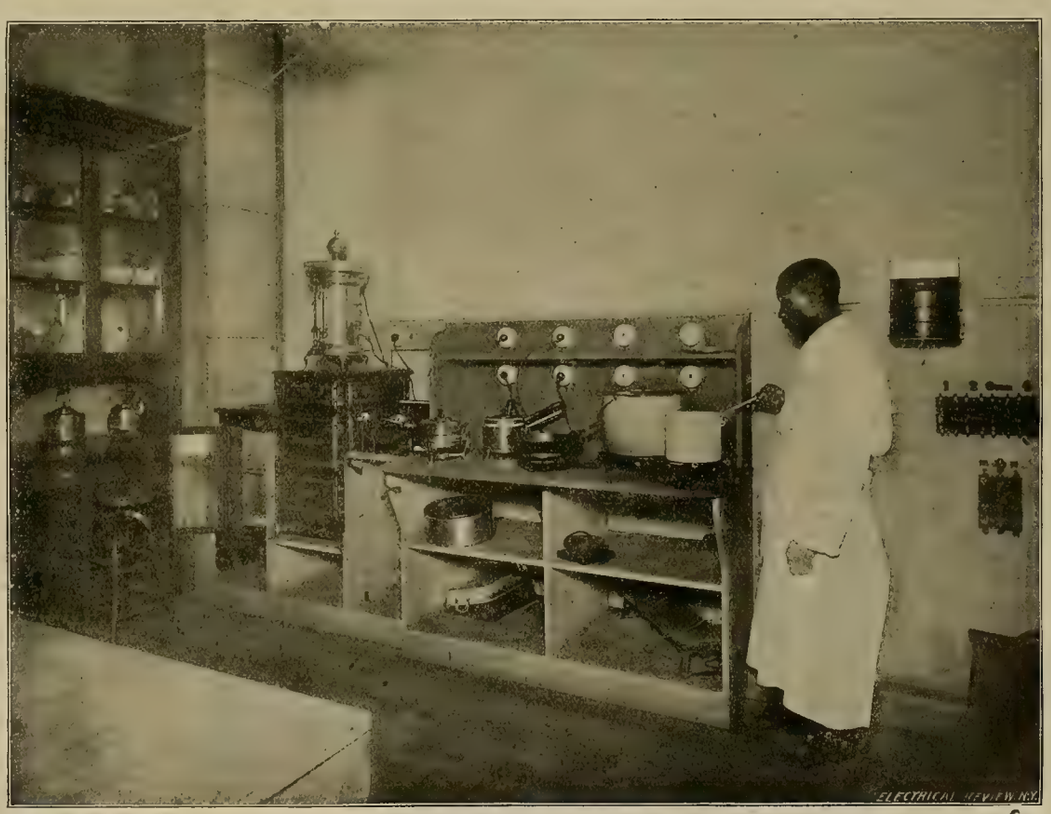
Some time ago the editor of this paper, on being shown through the works of the Edison Power & Light Co., on Stevenson street, San Francisco, noticed in one room several electrical appliances that Electrician Smith was devoting to culinary purposes, he expressing the hope that some day he would be able to install an electric kitchen.

This hope has been realized in the Duane street station of the Edison Electric Illuminating Co. of New York, where has been arranged a complete electrical kitchen, which is presided over by a skilled *chef*, who serves electrically cooked luncheons for the officials and heads of departments of the company. It is done by the Edison Co. largely with the view of illustrating the practicability of the electric system of cooking. This modern electric kitchen is portrayed in the accompanying engraving, for which we are indebted to the courtesy of our Atlantic contemporary and namesake, the New York *Electrical Review*.



MORENO DAM, SAN DIEGO CO., CAL.

The electric ovens are brought to the desired heat in a very short time and a uniform degree of temperature is easily maintained, so that the cooking process requires less time than by the ordinary heat direct from coal. For boiling sauces, vegetables, etc., special stew-pans and pots are utilized which are attached by means of a plug to the circuits and are operated independently, so that as varied a *menu* as may be desired can be prepared by merely attaching broilers and kettles to the service circuits. The kitchen is fitted with stone slabs for the cook's work, a white-tiled sink with hot and cold water and in the corner, standing close against the largest piece of cooking apparatus, the electric ovens, is the refrigerator, the radiation of heat being so slight as not to affect the ice in close proximity.



A MODERN ELECTRIC KITCHEN.

"This beats my old coal kitchen, for I have no ashes nor dirt, and when the heat is wanted it is there. It cooks in two-thirds the time that would be needed in an ordinary stove," said the *chef*. "I can bake a loaf of bread in sixteen minutes, a pie in nine minutes and biscuits in four minutes;" and he added, "your fire won't die down so that you must put fresh coal on, which deadens it for a spell and then gives too much heat." One of the officials of the Edison Co. said that current for electrical cooking at consumers' rates costs slightly more than fuel for coal stoves, but the economy was in the fact that work is done in less time with the current, and the heat is generated only when desired for service, ceasing the instant it is turned off, but that it had great advantages in cleanliness and ease of management, which would soon bring it into more common use.

Irrigation in Southern California.

Last year was a notable one in the development of water in the extreme southern part of the State. During '97 the great water system of the Southern California Mountain Water Company was greatly developed. The system comprises four immense reservoirs, known as the Morena, Upper and Lower Otay and Barrett's. During the year the Lower Otay reservoir was completed. The reservoir dam is 130 feet high, and will impound 42,000 acre-feet of water. The Upper Otay is a storage, and not a catchment, reservoir, and at 120-foot contour will impound 1059 inches. So far, only the foundation of this structure has been laid. The Morena dam, of which an engraving is here given, has been constructed to a height of almost 100 feet, but another 50 feet must be added before the structure is complete. At 150 feet this reservoir will impound 3219 inches of water. These works when completed will represent an investment of at least $3,000,000, and will command thousands of acres of productive land in southern California.

THE following is furnished by a practical man in answer to a request for "a good recipe to temper steel:" Heat to a dull red, rub with a piece of hard soap; then finish heating, harden in clear cold water. The potash in the soap prevents oxygen from uniting with the steel and forming a scale. In drawing, the colors can be seen without polishing the piece.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....General Manager

San Francisco, January 15, 1898.

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"I AM pleased to renew my subscription for '98. I consider the MINING AND SCIENTIFIC PRESS the most valuable paper of the kind in existence." This is in effect what a great number of men in this west half of America are now writing the business office. Leading advertisers say: "Did the announcements we carry in your paper cost three times what they do, we would consider the investment a profitable one." All of which is gratefully appreciated, the effort being to continue to deserve such kind statements from readers and advertisers alike.

THE general preliminaries of the Golden Jubilee and Mining Fair were arranged some time ago; the details now occupy the attention of the committees, who are working to the end that the whole thing shall be in every way an assured success. It is within the bounds of truth to say: "Better come than wish you had." The parade and week of festivities will be worth participating in, and the Miners' Fair, beginning January 29th and closing March 6th, will be of value and interest to every one in any one way connected with any form of gold mining. The Committees have decided that January 31st shall be "Miners' Day."

ANSWERING an inquiry as how best to clean amalgamating plates, Mr. Denniston, an experienced manufacturer of silver-plated amalgamating plates, gives preference in cleaning these plates to a weak solution of cyanide of potassium or a strong solution of salt and water, using a brush with each. To insure good amalgamation, the plates must be kept clean and bright. Grease or oil, of course, prevent proper amalgamation. The presence of these deleterious substances should be carefully avoided, and, if present, must be counteracted by the introduction into the battery of a saturated solution of wood ashes. Cyanide of potassium in dilute solution is used to promote amalgamation, but the practice of using the cyanide is less common than formerly. One or two pounds will be sufficient to clean the plates of a 40-stamp mill for a year. Some use a solution of vinegar and salt for cleaning plates. Very dilute nitric acid is also used, the plates being at once rubbed with quicksilver after being washed with clear water. The quicksilver itself is carefully washed and strained through a canvas bag to remove as many impurities as possible and again strained. On a small scale, it can be strained by hand through a chamois bag. When it becomes dirty or mixed with foreign substances, it must be retorted at a low temperature to thoroughly clean it.

It Is the Law.

Under date of December 29th, '97, a Sulphur Creek, Cal., subscriber writes as follows: "Has there been any test case on the new law which requires mining companies to pay all employes once each month for preceding month? Does this law apply to companies whose stock is not listed? Can it be made to enforce payment once each month for the previous month?" Upon looking this matter up it was found to be of sufficient importance to justify editorial notice. The following digest of the law is furnished by Mr. A. H. Ricketts:

"The Act referred to was approved March 29th, 1897, and went into effect April 1st, 1897. (Stats. 1897, p. 231.) By its terms 'every corporation doing business in this State' is required to pay its employes at least once a month the wages earned by them during the preceding month, and a violation of this provision entitles each employe to a lien on all the property of the corporation debtor for the amount of his wages, which lien shall take preference over all other liens except duly recorded mortgages or deeds of trust; and in any action to recover the amount of such wages, or to enforce said lien, the plaintiff shall be entitled to a reasonable attorney's fee, to be fixed by the Court, and which shall form part of the judgment in said action, and shall also be entitled to an attachment against said property. An unrecorded deed is no defense to such actions. On the trial of such actions the corporation debtor shall not be allowed to set up any defense for a failure to pay monthly any employe engaged in transacting or carrying on its business the wages earned by such employe during the preceding month other than the fact that such wages were not earned, except a valid assignment of such wages, a set-off or a counter claim against the same, or the absence of such employe from his usual employment at the time of the payment of the wages so earned by him. All assignments of wages for the purpose of evading the provisions of this Act are declared to be invalid. All wages earned must be paid in lawful money, or in checks negotiable at face value on demand. This Act provides further that no corporation shall require and no employe of such corporation shall make any agreement to accept wages at longer periods than are provided therein as a condition of employment. That any corporation violating any of the provisions of this Act shall be subject to a fine not exceeding one hundred dollars or less than fifty dollars for each violation.

"This law, by its terms, applies to '*every corporation doing business in this State*,' without reference to whether or not its stock is listed in the stock exchanges of this or any other place, or whether it is a State or foreign corporation. The mere fact that a corporation is transacting business in this State and employing men is sufficient to bring it within the purview of this law as far as the payment of its employes are concerned.

"Payment of wages under this law may be enforced by placing a lien upon all the property of the corporation debtor and by an action to foreclose the lien; and payment may be further secured by attachment proceedings. The lien, of course, would only affect real property, while an attachment might cover both real and personal property. In addition to the amount sued for, attorneys' fees and costs of the action may be recovered. Every corporation is also made subject to a fine of not less than $50 or more than $100 for each violation of the provisions of this Act.

"The decisions of the Supreme Court of this State do not yet appear to contain any consideration of this law by that tribunal."

This law appears to be an injurious one, restrictive and vicious in its operation, and how it slipped through the Legislature is of itself somewhat curious. While general in its application, it appears to be intended as a direct "cinch" on some particular corporation. It is believed that, were a test case made, it would be declared unconstitutional. It is certainly in opposition to business interests and probably could be justly entitled "A Law to Prevent the Investment of Money in Business Enterprises in California." It is very doubtful whether the Legislature of California has the power to say what kind of a contract private parties may enter into. However, it is the law, and, until repealed or set aside by the proper legal tribunal, will obtain.

IN response to three simultaneous requests for some plan to clean quicksilver, it may be said that the best way to clean quicksilver is to retort it, but it is not always convenient to do that unless all the appliances are at hand. The bulk of foreign matter may be removed by other means, however. A convenient device is a long glass tube into which mercury is poured through a paper funnel, the funnel having a pin-hole at the bottom and serving to retain the dirt and dust. The tube may be filled with dilute nitric acid and be provided with a stop-cock below, or with a bent tube so that a short column of mercury may balance a long column of acid. An ordinary filter in a funnel, with a hole in the bottom of the filter, will remove a good deal of impure foreign matter from the mercury. Another method is to place the mercury in a basin and force nothing but cold or warm water through it from below, and any grease or foreign matter is carried off. If one has not steam power, etc., water may be led in pipes with proper fall. The basin has a cock and valve to draw off the clean mercury. Care must be exercised not to force the water too violently so as to cut up the quicksilver too much, and so carry off finely divided particles. A little dilute nitric acid should be kept on the surface of the mercury in its receptacle.

AS IN the preceding years, the New York City papers credit Messrs. Edison and Tesla with making astounding predictions, one of the discoveries recently credited to the former being the ability to "photograph thought." On page 60 of this issue is given some account of Tesla's latest, and since that was printed it transpires that Mr. E. is now credited with declared ability to extract gold from low-grade ore at so low a cost as to justify erection by him "in the South" of a million dollar plant. It is probable, however, that the usual exaggeration of daily journalism is made manifest in reports of interviews with those distinguished electricians. The New York dailies of the 11th inst. additionally announce "the discovery of what Mr. Edison believes to be a new metal which will take the place of malleable iron," his belief being based on an unusually hard product from his new magnetic ore separating mill in New Jersey. The distinguished services to science of those two men lends great interest to what they actually say or do, but the general reader should carefully distinguish between the genuine and spurious utterances. This phase of "scientific progress" is briefly but justly discussed on page 61.

AS WAS to be expected, the purchase by the New Zealand Government of the right to use a patent cyanide process has stimulated the business of patenting processes designed to be of profit, and the Australian Mines Department is in receipt of sundry other proffers, though some of the proffered processes are more curious than profitable to the mining public. One gentleman wants to sell a formula for treating gold ore with a solution containing "55% ammonia and 45% sulphuric acid." It is probable that the New Zealand authorities will compel inventors in that line to give satisfactory proof of the value of their "processes" before entertaining any propositions of purchase.

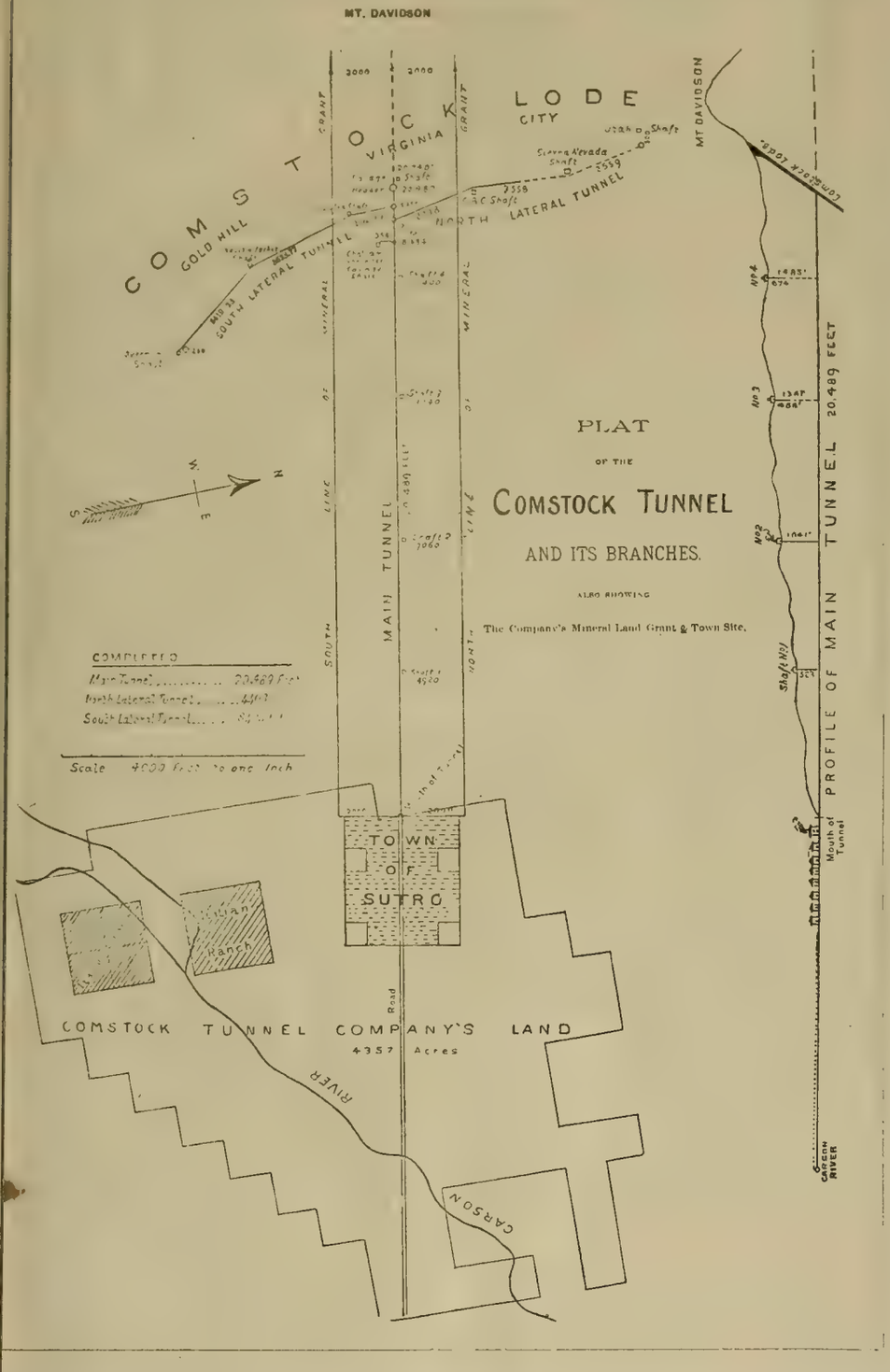
BY a recently enacted law of the Congress of the republic of Mexico permits for mining exploration, which have been so great a drawback to mineral development in Sonora, will be greatly modified. Under the new law such permits are to be limited to a period of three months only, and when one expires another covering the same area cannot be issued until six months afterward. Within that time the territory involved is open for prospecting to everybody, and discoverers can secure title to all ledges they find.

AN Arastra, Colorado, subscriber writes: "Will a pump with a 3-inch discharge raise water through a 6-inch pipe to the same height as it would through a 3-inch pipe?" All the conditions requisite to a full answer are not given, but, in general, it is largely a question of power proportionate to lessened or increased friction.

Report on the Brunswick Lode.

he managements of the different mining com-ies with locations on the Brunswick lode, Vir-a City, Nev., had a recent examination made n the possibilities of that lode. The main points he report are given herewith.

o understand the location of the lode is presented accompanying plot of the Comstock tunnel, ch cuts the Brunswick lode about midway in the age ground at shaft No. 3, 13,540 feet in from mouth of the tunnel, and at a depth of 1361 feet



om the surface. North of the tunnel, and adjoin-g the Savage, is the Gould & Curry, then come est & Belcher and Con. Virginia. To the south is he Hale & Norcross, Chollar, Potosi and Occidental.

Over twelve years ago John A. Church made an xamination of the Brunswick lode and wrote as ollows of its quartz bodies: "These form a mag-ificent system of quartz bodies parallel to the main ode—that is, the Comstock lode—and, so far as they ave been examined, quite equal to it in magnitude. Under any circumstances they are worthy of care-ul exploration, especially now that their fortunes ave been greatly improved by the construction of deep drainage adit—that is, the Sutro tunnel, now he Comstock tunnel. * * * All the known geo-logical facts make them just as promising quartzes as any the Comstock contains."

A large proportion of the latest report is taken up with a scientific dissertation on the lode to substantiate the deductions made, which corroborate Prof. Church's report made over a decade ago. The report says:

"The Brunswick lode has a general north and south course, the vein existing in a dyke of andesite of varying width—at times 200 and again 600 feet wide. The mineralized quartz vein meanders through the formation, but it holds more generally to the eastern or hanging wall side. The quartz is not found on the true contact walls, but a few feet distant. The hanging wall of the dyke, in which the vein exists, is porphyry, undoubtedly an altered andesite, and known on the Comstock as 'bird's-eye' porphyry.

"Between this 'bird's-eye porphyry' and the dyke there is a broad clay belt, showing not only the pressure and folding, but also establishing the nature of the ground in which the vein is contained. The hanging wall of the dyke in which this vein courses is an andesite containing crystals of sanidine and augite. The separations of the formations on the west, or foot wall, side are very faintly marked. It is demonstrated that the formations to the east of the hanging wall were later extrusive. Therefore we have a perfect fissure in the contact on the east side, in which the mineralized solutions which have produced the vein, or ore deposits, have followed the line of weakness. The dyke which controls and carries the vein is an andesite, which has been greatly altered by the intrusive silicious waters.

"From incline No. 2 (between Best & Belcher and Con. Virginia), passing north over the northerly end of the 'North' Cosmopolitan ground, and crossing the Six Mile canyon, the surface formations have taken a slide to the northeast. At some earlier epoch this last mentioned ground has had a deep-seated movement, also to the northeast, this movement having broken the Brunswick vein, or lode, at or near the road in Six Mile canyon. This deep-seated movement has likewise turned the southern end of the 'Monte Cristo' underground ore body to the west at the same time, or, rather, under the same movement, forcing the surface portion of the vein toward, and bending it over, to the east."

The above excerpt, particularly the latter part of it, seems to be the foundation on which the two experts worked in their examination of the lode, and that their deduction is correct is seemingly verified by examination of the lode, as far as practicable, both on the surface and underground. It is this fact that causes the two experts to express the belief that with work to the west paying ore will be found. They state that the systems of veins and stringers on which the Mackay, United States and Keyes are located run parallel with the Brunswick lode, passing through Silver Star and ending apparently east of the Buckeye. They express the belief that judging from the dip they join the Brunswick lode at a depth of about 1600 or 1800 feet below the surface.

The report says: "It can be stated that the Brunswick lode commences on the southern end of the Occidental locations, it being made of numerous feeders which there converge. Taking the lode running north from the summit, on the northern end of the Occidental locations—passing incline No. 1 (in the Hale & Norcross) and shaft 3 of the Sutro tunnel, and incline No. 2 to Six Mile canyon, the whole country has been pressed northerly and easterly. Taking the section of the vein and vein dyke which are shown in inclines Nos. 1 and 2, the formations exposed prove they have been under a great pressure from the west, so much so that the rocks show certain lines of cleavage plains, and also that the upper portion of the dyke, containing the vein, has been shoved over to the east and has then fallen back. It is particularly noted that these cleavage plains have a general northeast and southwest course; and where the matrix has been so pressed eastward these cleavage plains or seams are more or less filled with mineralized vein matter. These seams trend and generally lead to the ore shoots.

A seemingly thorough examination of several streaks and veins northerly of North Occidental were made, and of which the report says:

"These cross-veins or feeders all point toward, and seem to intersect, the Brunswick lodes on the grounds of the Chollar, Potosi and the northern end of the Occidental locations. These veins or feeders have more distinct and more perfect walls than those of the Comstock and Brunswick lodes proper; they are accompanied by a clay gouge and follow more or less the course of cleavage plains. The vein filling, though not as wide as on the lode, are more compact, containing, proportionally, more quartz, less gypsum and magnesia gangues."

In examining the underground workings on incline No. 1, the report says:

"The level of No. 1 incline which enters the Potosi ground is at the edge of this intersecting butte-dyke. To the west of this drift, near its south end, a chute of ore should be encountered. If this drift, which encounters the dyke, is driven a little east of south, toward the Occidental Consolidations, where the vein should be below the surface, on the pitch of the croppings which are on the south side of the intrusive dyke, it will pass through the mineralized streak.

"If this cross-dyke contains any of the royal metals, a body of pay ore should be encountered on the southern face of the intrusive dyke at its junction with the Brunswick lode on the Potosi ground, going toward the Occidentals."

The report mentions that one of the systems of mineral bearing streaks cut by the Silver City tunnel "has a course west of north, this being the Justice streak. The other streaks having a northeast course are those through the 'South' Cosmopolitan ground." * * * It further says: "At the north end the Cosmopolitan is intersected by the Succor. These two veins now course in close proximity toward the Occidental. If a shaft be sunk east of the Cosmopolitan's summit, at a distance of 650 feet, it would be on the line of depth of the joined veins which should exist about 1000 feet beneath the surface. The exploitation of this ground should develop large bodies of ore."

After a thorough and systematic examination of the underground workings in Occidental, they conclude:

"To strike the veins which are situate to the west of the butte, shown on surface at Incline, a crosscut should be run, a little north of west, at north end of 750 level. The future of the Occidentals is most promising, and the mineralized streaks, heretofore mentioned, at their convergence, should furnish a large body of ore."

A Great Gold Mine.

Written by JOHN W. GRAY.

In none of the newer portions of the world do the days of gold date back very far. In the colony of Queensland, Australia, they date back only some thirty years, but in that short time this province has added to the wealth of the world some £40,000,000. The rush to Gympie was the real beginning of the golden era, and the mines of Queensland are still producing annually gold to the value of two and a quarter million pounds sterling. No colony of Australia equals her in this respect, save Victoria, but the average yield for those engaged in the mining industry in Victoria is much less than in Queensland. The colony is said to possess large deposits of copper ores, and less extensive, but equally rich, silver and tin lodes, undeveloped, only waiting transportation facilities and the active hand of man to bring them into the range of competition and transform them into productive mines. Many of the metals and minerals, and most of those of large commercial value, together with several varieties of the more valuable precious stones, have been found within the borders of the colony. Charters Towers, with underground workings nearly 2600 feet in depth, Croyden, Palmer, and some half-dozen other localities, have become more or less well known to the mining world, but Crocodile is the most interesting field, and Mount Morgan is the property whose phenomenal gold production has most excited the wonder of all. This article, giving the story of the mining locality, and some description of its peculiarities and characteristics, has been mainly condensed from Australian mining papers and some other publications relating to the same subject.

On July 13th, 1882, Ned and Tom Morgan, with Sandy Gordon, an employe, set out from Rockhampton, with horses, on a prospecting expedition. They were to visit and examine a section known as Nine Mile creek, where Sandy said he knew of a silver lode. They arrived at the place on Friday afternoon. The next day they carefully searched for the silver lode, but without success. Shafts were sunk on the spots indicated by Sandy Gordon, and trenches were cut across several reefs, but nothing was found save a few specks of gold. With the night came a great rain storm, and in the morning, wet, disappointed, and generally uncomfortable, they set out to return home. They were obliged to swim the blind gullies, now running floods, and by noon had only been able to reach an old hut near the junction of Dairy creek with the Dee. Making a huge fire, they dried their clothes and cooked some food as well as conditions would permit. After eating, Ned Morgan, taking Sandy Gordon with him, started out to prospect the neighboring gullies until nightfall. Searching as they went, they crossed a range, and, coming down a gully, Morgan noticed a large black boulder. Knocking off a piece, and, seeing that it contained some mineral, he put it in his pocket. A little farther on he found a similar stone, and took a piece of that as well. Many of these large black boulders were seen around, apparently coming from the mountain above. Sandy Gordon was unaware of what Morgan had noticed, and he was not told of it. Owing to the fog and mist, they were only able to see a little distance, and it was with great difficulty that they found the way out and succeeded in again reaching the hut. Ned Morgan having told his brother what had occurred, the two crushed the stone and washed it out in the creek on a shovel. There seemed more gold than stone. The yellow metal was so abundant that they doubted its being gold. At 6 o'clock the next morning they made a camp upon the mountain. For several days they prospected, finding plenty of good stone, and washing now and then a panfull. Then Sandy Gordon was sent home with samples of stone for their brother, Fred Morgan, to test. Sandy got on a spree at a public house on the trail and did not return. Two days after the brothers returned to Rockhampton, and found that each sample brought with them was very rich in gold. Samples sent to Gympie for assay showed 3700 ounces of gold to the ton. The three brothers returned to the mountain camp, continued prospecting for several days longer, and then took up all the ground they could. For several months nothing was made known of the discovery. At the end of that time they took out samples from all the places they had worked. Some were given to T. S. Hall, manager of the National Bank of Queensland, and following this a partnership arrangement was made between the Morgans and Messrs. Hall, D'Arcy and Patterson, and steps were taken for the development of the ground. Thus was discovered and operations were first undertaken upon what was to become the greatest gold mine of Australia, if not the world.

After a time the various Morgan interests were purchased by the holders of the other half interest, for amounts aggregating some £75,000, and a limited company was formed, with 1,000,000 shares of £1 each. The total area of ground held by the company was 730 acres, and included the whole of the Ironstone mountain, to which and to the mine has been given the name Mount Morgan.

Ironstone mountain was known for many years prior to its development into a great gold mine. It was in the midst of the many alluvial diggings scattered over the Dee range, and often and again had old diggers crossed its top or followed around its skirts, seeking new patches of pay wash. Little did these fellows dream, as they passed over the rugged sides and ironstone boulders of the hill, of the wealth beneath their feet. It avails them not now to recall these facts, save to accentuate the sad refrain, "it might have been." A portion of the property had been taken up in 1864 as a cattle run by a brother of Sandy Gordon. He met with very poor success, however, and, losing most of his cattle in the dry season of 1876–'77, left his holdings. Afterwards the Morgans paid Gordon £1 per acre for what was considered a worthless right to the abandoned run.

The peculiar geological characteristics of the mine are puzzling and have given rise to a number of speculative theories as to the formation of the deposit. The mine is in many respects one of the most wonderful of gold mines. The deposit fills a crater-like basin capping a hill originally rising some 500 feet above the surrounding tableland, the most valuable portion forming the actual crown of the hill, a mass some 900 feet by 500 feet. The mine has been worked open-cast, or in quarry-like fashion, to a depth of 160 feet below the summit, over an arc 700 by 300 feet. The ore is a brown hematite containing some silica, and passes gradually into a ferruginous silicious sinter. Some of the ore is spongy and frothy in appearance and of very light weight. Both the ironstone and sinter contain gold, which is fine and disseminated throughout the rock. The underlying rock is a quartzite full of fine pyrites poor in gold.

The frothy silicious sinter is similar to the geyser deposits of Iceland and New Zealand and the hot springs of the Yellowstone Park, and the theory of the Government geologist of Queensland is that the deposit is the product of a geyser of enormous proportions, which carried chloride of gold dissolved from iron pyrites, oxide of iron being present in sufficient quantity to perform the function of precipitation, which may also have been aided by tannic acid derived from vegetable matter in the basin.

Another theory that has obtained currency is that the mass was the gossan of a large body of pyrites at a lower level.

Mr. Rickard's theory is that the auriferous deposit is rock shattered by the intrusion of dikes and then altered by the percolation of underground mineral solutions, which found easy passage through the cracked and broken material, the gold possibly being derived from the poor pyrites disseminated through the underlying quartzite, or the sandstones of the district, which have been proved to be auriferous.

Mr. C. S. Wilkinson considers the country rocks metamorphosed stratified rocks, containing pyrites disseminated in small quantity. They are pierced by dikes of granite and dolerite. Water percolating the pyritic strata in the neighborhood of these dikes, the dolerite became kaolinized and the pyrites decomposed, the gold being deposited and redeposited along with oxide of iron produced from solution of the pyrites.

In the matter of metallurgy, a satisfactory method of working the ores was only arrived at after much costly experimenting and unremitting effort. Mr. J. F. C. Johnson states that when he visited the mine the ore was fed directly into roller mills. After crushing, it was delivered to the roasting furnaces, and thence passed to the chlorinating sheds. The chlorination works are the largest in existence. Very large vats are used. Chlorine is applied as chlorine water, the consumption, it is thought, being thus far better controlled and kept down to that required for the extraction of the gold. The use of chlorine of lime and sulphuric acid has been superceded by manganese salt and sulphuric acid, and the installation of chlorine stills, towers and solution tanks. The percentage of gold extracted is 95 per cent of the assay value, and the gold is the purest yet found anywhere, containing 99.7 per cent pure gold, the rest being copper, with traces of iron and silver.

The mine was opened in 1886. It has produced upwards of $30,000,000 and has paid enormous dividends. Up to 1896 the shareholders had divided among themselves forty-three and one-half tons of standard gold. In 1896 the dividends amounted to over 34 per cent of the paid up capital. In 1897 the yield, based upon the ore worked, was $30.29 per ton, and the total working expenses $12.53 per ton. The heaviest items of cost were for labor and fuel. Total expenses were 41.5 per cent of returns.

The value of the ore has decreased from 5.8 ozs. per ton in 1887 to about 1.5 ozs. per ton. The average value of ore worked to May 31st, 1895, was 2 ozs. 13 dwts. 5 grs., equal to about $53 per ton. The highest value seems now to be in the mundic or pyritic ore, which, in the year ending May 31st, 1896, averaged 3 72 ozs per ton, while the ordinary ore gave 1.12 ozs.; value per ounce, $19.92.

The mine is continuously a great producer and gives every present promise of remaining so. The story of Mount Morgan is only one of others which could be told, of the extraordinary results frequently obtained in this one branch of mining alone. Equally astonishing results have been obtained in the production of other minerals and metals, so that there is little wonder that mining is fast becoming to thought one of the most fascinating pursuits offered to mankind. When we consider the very great diversity of the metals, minerals and precious stones of large and growing commercial value, and the constantly increasing demand, desire and even necessity for these things, and the further fact that many of the best minds of the age are steadily at work improving all the metallurgical and mechanical aids to successful mining, and simplifying and lessening the cost of all the practical operations connected therewith, who will undertake to foretell the possibilities of the future of this great industry?

The Solvent Powers of Cyanogen.*

Written by WM SKEY.

The gold in the test paper used in the experiment volume for volume, only weighs half as much as hydrogen gas. Broken up in this manner in the test paper, it is in very truth fine gold; in fact, gold divided almost to its ultimate atom (if, indeed, atoms do exist)—gold in the cloud form, as it were, and therefore in the best condition I know of for my purpose. Provided with a test so delicate as this, we get results in an hour that, using the gravimetric test for loss, would require several days, and so we avoid those errors that are apt to creep in and vitiate our results when long periods of time are required for experiments of this nature. Placing then, in a porcelain vessel a strong aqueous solution of cyanogen, along with a little of this gold test paper, I closed the vessel down airtight, and on examining at periodic intervals I found that even after the expiration of six hours, corresponding to sixty-two days for gold leaf, there was no visible diminution of the color of that test paper. After this, however, the tint gradually faded, until in thirty hours it had quite disappeared. Thirty hours to dissolve the millionth of a grain of gold so finely divided as this grain was shows that if cyanogen itself does dissolve gold, it is only at an extremely low rate—at such a rate that ordinary gold leaf would require about one year to become entirely dissolved therein. The cyanogen I used, though very carefully prepared, has a slight acid reaction; it contained traces of ammonia, hydrocyanic and hydrochloric acids, and this even when, to avoid producing them, I used the protochloride in place of the bichloride of mercury. And I may further state that the solution of this cyanogen kept persistently acid even when it was three weeks old and much of the gas decomposed; and, what is more singular still, the solution was much more solvent of gold at that time than just after it had been made. It was, therefore, apparent to me that it is not *any* degree of acidity in a cyanogen solution that does, as is now supposed, conserve this gas. It is not a mild acidity that is always effective for this purpose. So I increased the acidity of the cyanogen solution by adding to it a few drops of hydrochloric acid, and tried another gold test paper therein, when I was unable to detect, even after the lapse of seven days, the slightest change of tint had been produced upon the test paper. Hydrochloric acid had not any retarding effect upon the dissolution of gold in weak solutions of bromine.

That cyanogen would have very little tendency to form by its decomposition solvents for gold as used upon quartz, etc., at the gold mines appears to me absolutely certain, as both air and water are generally acidic, and all the reef quartz I have yet tested also gives an acidic reaction.

I will give a few notes respecting the cyanodizing of gold, etc., in anticipation of papers I am now preparing on the subjects:

NOTE 1.—Very fine granular gold, such as that in these papers, or that prepared and described by Professor Faraday, requires far more time (weight for weight) to dissolve in potassic cyanide than solid gold, such as gold leaf, the former taking fully a hundred times longer than the latter, and this though the extent of its superficies is comparatively greater. This fact leads me to suppose, as the only explanation thereof, that the metal, as it exists in the ruby form on the paper here, is in a different chemical state from that of ordinary or massive gold—that is, this gold is in an allotropic form.

NOTE 2.—Gold leaf placed upon the surface of a strong cyanide solution is whitened throughout before all being dissolved therein. The white film resulting is only very slowly soluble, but if the solution of the cyanide is weakened a good deal the film rapidly dissolves. This film is a cyanide of gold, and its presence under these circumstances confirms the correctness of a statement of mine that in the cyanide process the cyanodizing of the gold is not always, if indeed it is ever, simultaneous with dissolution—that, in fact, the latter process often lags considerably behind the former process.

NOTE 3.—Gold leaf as on the surface of a weak cyanide solution is at first strongly positive to the same kind of gold leaf as immersed in this solution, but it very shortly becomes negative thereto, and remains so until dissolution breaks the voltaic con

*Condensed.

on. The singularity of this circumstance is us when we consider that gold on the solution more rapidly attacked by cyanide than is gold is beneath the surface. This is an interesting hat requires explanation.

TE 4.—Kerosene, gasoline and hydrocarbons rally, when placed over gold leaf that rests on surface of a cyanide solution, do not sensibly fere with the dissolution of that gold, if only en has free access to the hydrocarbon used. result shows, first, that the rapid dissolution of leaf as placed on the surface of cyanide solu- is not in part due to the action thereon of 'air ic circles,' as is stated by Professor Faraday, tmosphere itself being cut off; second, that hydrocarbon oils are pervious to air, or at the oxygen of it; and, third, that a very minute tity of oxygen is as effective for promoting or ting towards the rapid dissolution of gold leaf ng on solutions as is an unstinted supply of it.

Hydraulic Mining.*

NUMBER V.

e Discharge Pipe or Nozzle.—To that part of the aulic apparatus connected with the final dis- ge of the water through nozzles various names been applied, such as the "goose neck," be monitor," "dictator," "deflector," "knuckle ," "little giant," etc.

hile certain of these names are suggestive of e property, feature or other peculiarity of the hine, more of them would seem to have no spe- significance, although for each of these devices nventor has claimed some peculiar merit, and always without reason, only a few of the entire ber are now in much use.

or the information of those not posted in these ters it should be explained that, in miners' par- e, the terms monitor, nozzle and giant mean all same thing, they being applied to these several hines indifferently, and in the case of the nozzle improperly, as this is only an appendage of the aratus, being only the projecting tube or nose ugh which the water makes its final escape. re is need for a specific name for these discharge s, which should designate and be confined to portion of them by which these movements are cted and controlled, and thus the present confu- be avoided.

hese pipes range from 4 to 9 inches inside diame- the quantity of water they are capable of dis- rging varying from 300 to 1500 miners' inches, rding to size, pressure, etc. They can throw an ctive stream on a gravel bank 200 feet away. quently as many as four, and even five, of the est sized machines are played in a single pit at same time, each machine discharging from 1500 700 cubic feet of water per minute. Notwith- nding the force of one of these large jets of water, ndurated or so tenacious are some portions of the vel to be washed that it has to be shattered with er preparatory to playing the water upon it. force of a large stream of water as it issues n one of these nozzles is hardly less than that of annon ball at the instant of its discharge. When rated the machine is brought as near the bank as compatible with the safety of the pipe man, in er that the full effect of the jet may be obtained. en the bank is very high fatal accidents some- es occur through its sudden caving. When much r 100 feet in height the bank is piped off in ches as a safeguard against accidents caused by se caves.

When it is said that a full set of the largest of se machines, as we sometimes see them operat- in the hydraulic mines, is capable of perform- the work of 1000 men, the remark is to be derstood in a literal sense.

Bank Blasting.—When the material to be piped off o hard or so tenacious that it cannot be readily oken down and disintegrated by the stream of ter thrown upon it, recourse is had to powder for complishing that end. So, too, when the gravel nk is dangerously high, it is to be blown up with wder. The preliminary work required for this rpose consists in running suitable drifts under the nk to be blown up, charging the same with pow- r and laying the fuse, after which the main drift to be thoroughly tamped. The drift is run in on e bottom from the face of the bank, a distance pro- rtioned to the height of the latter and the nature the ground to be blown up, the quantity of pow- r used being determined by the same conditions. a rule, the length of the main drift should be out three-fourths the height of the bank, if this considerable. From the inner extremity of this ift a crossdrift is driven each way, forming a T;" or, if the quantity of powder to be used is ry large, the ground being heavy, two or more of ese crossdrifts are to be driven. Each arm of the ain or terminal crossdrift should be from 40 to 50 feet long; of the others, about 30 feet. When the bank has an extended face and only moderate depth, several parallel drifts may be run, or as many as conditions seem to require, their length being proportioned to the depth of the bank. In all cases the length of both the main and lateral drifts must be in proportion to the extent and nature of the ground to be shattered, both of which, therefore, should be carefully studied in advance. The main drift should be as small as can be conveniently driven, say 3 feet wide by 4 feet high, the crossdrifts being a little larger. Sometimes instead of carrying in the main drift from the face of the bank it is extended from the bottom of a shaft sunk for the purpose. Occasionally short drifts called "lifters" are driven at right angles to the crossdrifts, from the ends and centers thereof, these "lifters" being carried back toward the face of the bank.

For blowing up shallow banks or patches of bottom gravel shafts with a crossdrift at the bottom, or having the lower part enlarged, giving the shaft a bottle shape, are employed. These are tamped and fired in the same manner as the horizontal drifts The shaft, when the bank is not extremely high, answers about as well as the drift, and possesses the advantage of being much more easily tamped than the latter, as the material used for this purpose, being that excavated in sinking the shaft, has to be simply shoveled in.

The quantity of powder usually employed on these occasions varies from 100 to 200 kegs to as many thousand, each keg containing twenty-five pounds. The minimum quantity required varies from sixteen to twenty pounds for every thousand cubic feet of ground covered by the drifts. Small blasts, other things being equal, require more powder in proportion to the ground than large ones. Thus, if 500 kegs of powder will break up from 40,000 to 50,000 cubic feet of gravel, 1000 kegs may be expected to reduce 120,000 cubic feet to a like condition. It is calculated that a successful blast will prepare double the area of ground covered by the drifts. As nearly as can be estimated there should always be enough powder to thoroughly shatter the bank, an excess being better than a deficiency. Two-thirds of the powder used should be placed in the terminal crossdrift, the balance in the other crossdrift. Where the drifts are dry the powder may be emptied in long boxes, or be left in the kegs, their heads having been removed. If there is water in the drifts or shafts the powder must be put in water-tight boxes, the lids being pierced with holes to admit the fuse, after which having been introduced the lids must be fastened on firmly and the holes closed with wax, putty or other substance impervious to water.

After the boxes or kegs of powder have been placed in rows and covered with paper, the electrical wires are extended along them. The exploders are inserted in giant powder cartridges extended along on top of the paper covering the powder. The wires laid in the lateral drifts are then connected with those extending along the main drift to the electrical battery. If fuse is to be used for exploding the charge, it is here properly put in place—for the sake of greater security two or three lines being laid. In the center a layer of heavy rock is placed, forming the basis for the filling in or tamping, the material removed in excavating the drift being employed for this purpose. It should not be too damp, and, if present, all very large stones should be thrown out, as they may cause serious damage and perhaps injury to persons should a "blow-out" occur. Sand and fine gravel make the best tamping material. The tamping, jammed in with wooden rams, should be thoroughly done, so that it will not settle, leaving a space between it and the roof of the drift. Sometimes a barrier of timbers is placed across the main drift at the intersection of the first crossdrift prior to the former being filled in.

For several years, at first, common blasting powder was used in blowing up these gravel banks. Gradually, however, this has come to be almost wholly superseded by the use of a low-grade giant powder. For blasting boulders, trunks and stumps of trees, lava, pipe clay, hard bottom, cement, etc., nitro-glycerine explosives are employed.

For firing the charge, both the common and electric fuse are in use. When the latter, one should be inserted for every forty or fifty kegs of powder, as this insures simultaneous ignition and complete combustion of the powder, whereby its entire force is usually developed. The firing is usually accomplished by means of a high-tension electrical machine placed at a safe distance from the mine and connected with the insulated wires.

The Derrick.—For handling the larger boulders a derrick, operated usually by a hurdy-gurdy wheel, is employed. When, as occasionally happens, a boulder is encountered too large to be raised by the derrick, it is broken up with nitro-glycerine or giant powder into fragments so small that the derrick can lift them and swing them around out of the way, some of these machines having a lifting capacity of ten tons or more. The larger class of these structures have a mast 100 feet high and a boom 92 feet long. The mast is supported by guys of 1-inch wire rope, a whip block with ⅞-inch steel rope being used for hoisting tackle.

The guys, six in number, are held by double captstans. Where the derrick is to be moved but a short distance, as a hundred feet or two, this is usually accomplished with wooden rollers and without being taken down.

Begun in issue of Dec. 18th, '97.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER I.

By GEO. F. BECKER.

Exploitation on the Witwatersrand has hitherto been confined almost entirely to what are known as the outcrop properties and to depths of less than 1000 feet. These upper workings have been elaborately described, the most recent and thorough descriptions being by Messrs. Carl Schmeisser, Hatch and Chalmers, C. S. Goldmann, and L. De Launay. Within a year some of the deeper shafts on the Deep Level properties have reached the ore-bearing strata. The deepest shafts are, I believe, those of the Robinson Deep, close to Johannesburg. On this property No. 2 shaft cut the South Reef (or the highest of the important conglomerate beds) in July, 1896, at 1806 feet. At the point encountered this reef assayed three ounces over a width of 12 inches. In March, 1897, No. 1 shaft cut the South Reef at 2385 feet and found it assaying five ounces over a width of 6 inches. A bore hole called the Bezuidenville has cut the reefs at 3251 feet from the surface and 5800 feet from the outcrop, finding them auriferous. This bore hole is close to town and directly south of the Meyer and Charlton. The Rand Victoria bore lies some five miles to the eastward of the Bezuidenville and at 4100 feet from the croppings. It cut the first reef at a depth of 2343 feet, where it assayed one ounce four pennyweights.

There is little doubt that exploitation on the Witwatersrand can be pushed to a depth of 5000 feet. There is no indication that heavy ground or unmanageable quantities of water will be met with, and while the data as to temperature increment are thus far very unsatisfactory, they indicate only a rise of 1° F. for from 82 to 100 feet of depth. A careful scrutiny of the conditions leads me to believe that there are no serious natural obstacles to mining in this region at 4000 feet, nor, under proper management, would there be any excessive unavoidable expense. Whether the deposits will remain remunerative at such depths is a separate question.

The future of the Rand is a more important matter than its past. Whether or no the gold-bearing series will continue to carry profitable quantities of the precious metal, and whether they will turn out to be productive when followed on the surface to greater distances from Johannesburg, are questions the answers to which must be deductions from the true theory of the genesis of the deposits. The discussion of gold deposition on the Witwatersrand is a very responsible task, for an error in the conclusion might easily lead to lamentable disasters. It should, therefore, be undertaken in a thoroughly dispassionate spirit. I shall begin by marshaling the facts, so far as I have been able to ascertain them, and then review the theories which have been advanced to account for them. Some of the analogies to be drawn require more details as to other deposits than it is convenient to give in discussing the Witwatersrand pudding stone, and these will be given by themselves in a separate division of the paper.

The Gold-Bearing Region.—Before entering on the details of the occurrence of gold in the great deposits about Johannesburg, it may be well to glance at their general relations to the auriferous regions of southern Africa and to sketch, in barest outlines, their geological position; for these general relations will contribute somewhat to a comprehension of the conditions under which the deposits were generated. It must be understood, however, that the stratigraphy of the region has not been thoroughly worked out, and that, though a number of geologists and mining engineers have studied some questions, the information has for the most part been gathered for the benefit of companies to whose interest it is to withhold information. Partly as a consequence of these conditions great differences of opinion exist among those who have given public expression to their views.

A large area in South Africa is known to be auriferous; indeed, there is a strong probability, as has often been pointed out, that the Ophir of the ancients was in Mashonaland. The area to the northward of the Transvaal which is dotted over with proclaimed gold fields may be estimated at 75,000 square miles. The gold fields of the Transvaal cover about 55,000 square miles. It is quite possible, of course, that there are other undiscovered fields within or without this region. Johannesburg, Heidelberg, Pochefstroom and Klerksdorp lie at the southern edge of the auriferous area. These are also the only districts in which the gold is found in conglomerates, all of the more northerly fields being characterized by veins not dissimilar to those of other gold-bearing regions, such as California and Australia. They are usually associated with schists and granitoid rocks.

* Eighteenth Annual Report Mineral Resources of the United States.

(*To be Continued.*)

Mining Summary.

CALIFORNIA.

Amador.

J. J. Davis and R. L. Marsh, at French Camp, are opening a property with good results. There is enough ore in sight to warrant building a 10-stamp mill, on which work has begun.

Record: The Argonaut crushes 120 tons a day. The ore yields an average of $15 per ton.

Little is doing at the Bellwether beyond keeping the water out.

The Potazuba, at Sutter Creek, is down 550 feet and drifts run on the ledge. The ore, while low grade, is of a promising nature, increasing in value.

The *Record* says it is reported that S. C. Wheeler has disposed of his mine to a company of Salt Lake City people, who purpose the enlargement of the mill and erection of up-to-date hoisting works.

Machine drills have been added to the equipment of the Amador Queen No. 1 mine. The shaft is down 800 feet.

The shaft at the Amelia is down 450 feet. Supt. Reese says they will carry it to the 1000-foot mark before crosscutting.

Butte.

(Special Correspondence).—Two miles above Dogtown a gravel property is being developed. A Boston corporation is working it. They have a tunnel in 1000 feet, cutting into an ancient channel. The incline runs through 200 feet of gold-bearing gravel that runs from $4 to $15 per car. This is from testimony given under oath. A piece of gold was found that weighed $800. The company owns 320 acres. The tunnel has not reached beyond the rim rock very far; consequently, at present writing, it is not known how wide it will prove. It is known as the Alki mine. C. B. Frost is Mgr.

Chico, Jan. 11th, '98.

Several men have been working the tailings from the Katskill gravel mine, near Bangor, and made fair wages.

The Oroville *Register* says two men, after ten weeks work near Enterprise, took out a beer bottle full of gold.

Calaveras.

A local report is to the effect that the Gwin mine has passed under the ownership of the Gwin Mine Development Company by the recent payment of the four years' bond of $200,000, which would not have expired until December 31, 1898. The original amount agreed upon for the property was reduced by the payment of royalties, and a rebate of $21,500 made by the late owners, the heirs of Senator Gwin, to about $146,000.

The Jupiter Gravel Mining and Water Company has levied an assessment of 20 cents per share, delinquent February 10th.

The case of the Lightner M. Co. vs. the Utica M. Co. was filed in the Superior Court last week. The action was brought to recover $250,000 and costs.

At the Tracy mine the shaft is 65 feet. The intention is to go 400 feet before doing any crosscutting. F. Brandt is Supt.

The Stickle mine and mill, says the *Echo*, closed down for want of water, and the report is current that if rain does not come soon the Utica will also have to close down.

The Cross shaft has reached 1250 feet and sinking has been suspended for a time. Stoping will commence shortly.

El Dorado.

(Special Correspondence). — At the Grand Victory mine, the mill, which has been idle for several months, started last week. It is generally understood here that the English company who bought this property and have made a payment upon it, will carry out their contract and complete the purchase.

At the Griffith Consolidated the new hoist, capable of 1500 feet, is in successful operation. The development work is very encouraging in its results.

At the Larkin the 5-stamp mill is steadily running and the mine is improving as development work continues.

The Selby has ceased work. This is supposed to be only temporary, until new stockholders become interested.

After several months of idleness the Big Sandy mill is again running.

The Lone Star group, which is under bond to Thos. Clark, is showing some good ore, and development work is proceeding favorably. This is a new property situated about five miles east of here. At the Boulder they have drifted 243 feet east and west on the 700 level, and in all this there was not a barren spot. From the 700 level the company is sinking a winze. They find that the deeper they go the better the mine proves itself. The cost of mining and milling the ore at the Boulder is about $2.40 per ton. The returns in the Boulder are quite satisfactory to the owners. This property is doing much to show that what is required in El Dorado county to prove it a good mining section are capital and depth, S. C. Wilmans, Rescue P. O., is Supt.

The Try Again hydraulic property, 2½ miles east of town, comprising 438 acres, is awaiting the thawing out of the El Dorado Co.'s big ditch to begin operations. This is a new property so far as the present method of working it, though in sluicing it has in parts produced coarse gold. The unusually cold weather here, unaccompanied by snow or rain, has been a complete hindrance to gravel mining in this section. The Try Again will have 800 inches of water under a pressure of 370 feet. The company is composed, I am creditably informed, of Oakland and San Francisco men of means, who will give this ground a thorough and systematic test. F. W. Cook is local manager.

Placerville, Jan. 10th, '98.

The Sunrise, near Kelsey, after cessation of work for a year, began development work which they intend to prosecute.

Work at the Grizzly Flat gravel mine, of which A. A. McDonald is Supt., is progressing. The ten stamps are running steadily.

W. R. Pearson is thoroughly developing the Mt. Hope at Grizzly Flats.

Nugget: W. F. Lupold, at the Rosebud, near Brownsville, struck ore that goes from $40 to $50 per ton, and the indications are that it will last.

S. A. Lane is taking out some high-grade ore at his mine in Omo district.

Kern.

The surfacing of the Kramer & Randsburg Railway will be completed to-day and the road turned over by the construction company.

Near Randsburg the G. B. mine, Stringer district, has been bought by Koehn & Jewett for $35,000, one-third to be paid Jan. 20th, the balance in thirty, sixty and ninety days. Ore is being hauled to Kane Springs for milling.

H. R. Bacon purchased a half interest in the Republic mine for $600.

J. R. Parker had three tons of ore from the Juanita milled, which produced $50 per ton. His shaft is 80 feet.

Ore from the Yellow Aster is crushed at the Pioneer mills.

Work was commenced on the cyanide plant this week under the direction of Dean & Brand.

Californian: F. K. Wilson of Randsburg deposited $38,680 in payment of the Butte mine, Randsburg. There were several payments made before, amounting to $20,000.

Lake.

A press dispatch from Lakeport says that ore assaying $5672 in gold and $90 in silver to the ton has been discovered two miles from Adams' Springs. If the first two figures are left off the story may be worth notice.

Los Angeles.

The San Bernardino *Sun* announces that the Gold Bronze mine and mill were sold at receiver's sale to the J. M. Hale Co. of Los Angeles for $4470.35. This represents merely the claims which were a first lien on the property. The total amount of indebtedness was $28,000, but the secondary claims will be unprovided for, unless the others take the plan of redeeming within the statutory six months.

Madera.

(Special Correspondence). — The Spencer mine on French Gulch, Fresno river, is running a 10-stamp mill continually on ore reported to be worth $20 per ton.

At the Gambetta two shifts of six men each are doing development work. The ore is crushed in a Huntington mill.

Twelve men are employed at the Lucky Bill mine.

Some rock running over $600 per ton has been struck in the Wagener mine, situated on the road from Raymond to Coarse Gold. The mine is owned by Shaw Bros. of Raymond and the ore is worked in two steam-power arrastras.

At the Last Chance mine, Fine Gold district, an adit level is being run to tap the bottom of an old shaft in order to afford drainage. The level is now in over 250 feet and will extend about 100 feet farther. Four men are employed. When this drainage tunnel is completed the work of extracting ore will begin.

Mariposa.

(Special Correspondence).—Martin J. Heller has bonded from the estate of Andrew Olcese the Francis mine, situated about seven miles southwest from the town of Mariposa. The bond runs until June 30th, '99, and the consideration, which is not made public, is understood to be in the neighborhood of $20,000. Mr. Heller also examined the old Compromise mine, better known as the Marble Springs, on the north fork of the Merced river above Coulterville, with a view to taking hold of the property. He is understood to be acting in the interest of Mr. Mackay and his associates.

The Merced mill at Coulterville was closed down on the 10th, pending the improvements at the Mary Harrison mine.

The Mariposa Commercial and Mining Co., owners of the Mariposa Grant, which comprises 44,000 acres and covers twelve miles of the mother lode, has levied an assessment of $5 per share, delinquent Feb. 11th next. Considerable activity is manifested among those locally connected with this property, and the regular rumors of an impending start up are going the rounds again.

A. Wartenweiler and C. A. Molson examined the Red Banks and Crown Lead properties last week.

Mariposa, Jan. 11th, '98.

Nevada.

The machinery on the Phœnix at Nevada City has started and works to perfection. Supt. Shockley is pushing work in reconstructing this long-abandoned property.

Telegraph: Good reports come from the mines at Brown's Valley, especially from the Pennsylvania, where they have a 9-foot ledge, a crushing from which yielded $4 per ton.

Transcript: The shaft at the Texas is 160 feet. The work is progressing under Supt. McFall.

At the Mountaineer Supt. Dennis started the mill last week.

The last crushing from the Wisconsin at Grass Valley paid $44 per wagon load.

The Mistletoe mine, near Rough and Ready, is a good grade and is being rapidly developed.

Union: C. Cleveland sold his quartz property adjoining the Kirkham mine to La Suerte Co.

Transcript: The shaft of the Stanford has reached 340 feet. The north drift is being extended, and the prospects are encouraging. Supt. Thomas is making good headway. J. H. Neff and others are developing this under bond.

H. Goering has nearly forty tons of ore on Round Mountain. It is heavily sulphuretted and gives good returns.

Colfax *Sentinel*: The Red Dog M. Co. has a permit to mine by the hydraulic process. The restraining dam will be located one-half mile below You Bet station. Work has begun on the dam. It will be 40 feet high and 170 feet long.

Union: A 2-foot ledge has been struck in the lower tunnel of the Delhi, near Columbia Hill.

Placer.

On the Bellvue mine at Ophir the vein is from 2 to 3 feet and the shaft is 80 feet.

The Supervisors appropriated $750 for the Golden Jubilee Mining Fair.

The annual meeting of the Eureka Drift M. Co. was held last week. The following were elected directors for the ensuing year: F. Chappelet, F. A. Leach, H. P. Dalton, C. E. Colton and A. E. Bolton. The company is in good financial condition and has ample funds for the completion of development work. It is thought that by next May they will be washing the gravel from the deep buried channel.

The Maus mine shaft, near Forest Hill, is down to the 100-foot level. It is double compartment. A 10-H. P. hoist is used. The New Austral Co., Ltd., of Paris, France, is interested. S. Roumage is Mgr.

Sentinel: At the the Bartley Con. drift mine at Dutch Flat the main tunnel, running with the channel, is 1150 feet. At 400 feet a crosscut 350 feet shows no sign of the rim. The mine comprises 110 acres of channel. The gravel from the main tunnel and crosscuts pays for the development work. W. Rablin, one of the owners, is superintending the work.

The 10-stamp mill at the drift mine of the Gold Run Gravels Co. at Gold Run was started last Monday.

Riverside.

At Eagle Mountain district, besides the several quartz ledges opened up, work is progressing in Placer canyon, three or four miles in length. Some of the men are said to average an ounce a day.

San Bernardino.

The Victor M. Co. is working a large force of men at Oro Grande. A new mill has been completed.

San Diego.

(Special Correspondence). — The Helvetia mine, near Julian, is still supplying its mill with its full capacity of rich ore.

The first of January transfer of ownership of mining claims in this county was decidedly active. Everything believed to be good, upon which assessment work had been omitted or neglected for '97, was properly cared for by some one who had kept an eye to labor expenditures the year through. In some instances of the more valuable properties, two or more different parties were on the ground with the same intent at the same time.

The "mill crushing" of ore from the Mountain View mine, in the Julian district, recently made, gave a yield of over $100 to the ton. The directors of the company have let a contract to sink a shaft 100 feet, preparatory to more active development in the spring. The work is now being executed and some fine rock is being taken out.

The Ranchita mine, near Banner, has secured the services of Mark Lamb of San Diego in the capacity of assayer and metallurgist. The mine is a constant producer.

Julian, Jan. 10th, '98.

Sale was made of the Dale group, Virginia Dale district, to the representative of an English company. The mines will be developed. It is said that the ore assayed $30 a ton. The price is reported at $45,000, which includes a small mill, buildings and 1000 tons of ore on the dump.

A mortgage on the mines of the Sweetwater M. Co., on the Colorado river, to Julius Wolff for $10,000, was released last week.

Supt. Clark of the Stonewall mine at Banner has been prospecting the tailings deposited by that mill, and is convinced that enough money can be made from them by the cyanide process to possibly pay off all claims against the property. The Cuyamaca lake is so low that prospecting can be carried on where hitherto it was impossible. There are many thousands of tons of tailings, estimated to run from $3 to $5 per ton.

Shasta.

The California Con. Iron mines, on the McCloud river, have been surveying for a patent. Five men have been developing the property. R. Radcliff is Supt.

Another ledge of base ore has been discovered in the Backbone mining district. The ore body is 65 feet wide and assays $7 per ton in gold and silver and 2½ per cent in copper.

Courier: The Texas Con. Co., at Old Diggings, is reported in financial troubles. A chattel mortgage and bill of sale are recorded, transferring the mine, store and stock of goods to E. J. Sittig and W. J. O'Donnel, who represent fifty employes. The store is to be conducted for the men as preferred creditors, and the surplus will go to the Joshua Hendy Machine Works in San Francisco. The mortgage is to secure promissory notes for $12,000 for labor.

Ormsby & Berger are getting good ore near South Fork.

E. L. Ballou is getting out ore on the Hope and Manzanita claims.

Press: W. Forstner, of New York, has secured a bond upon the Mammoth group three miles west of Kennet.

Searchlight: The Brown Bear at Deadwood gives employment to fifty men more than at any one time for three years. For the first time in two years the full seventeen stamps are employed on company ore.

Sierra.

The All Nations Co. secured a permit to extend their tunnel under and across upper Main street in Downieville.

Siskiyou.

Journal: Miners along the Klamath, expecting to start up work in their hydraulic claims, have not been able to do so yet, owing to lack of storms. The quartz mills at various points are starting again, having closed in consequence of cold nights freezing the water in the batteries.

The Chinese Co. continue to find good pay on bedrock. They are working a steam derrick and making $40 a day.

At the Greenhorn Blue Gravel the gravel is paying $1 to the tub and 160 tubs are hoisted each shift.

The Hegler mine is being prospected for Colorado men.

Tulare.

Ore has been struck in the shaft on the Comet at White River at a depth of 110 feet, which prospects $125 to the ton. The ledge is 8 inches wide.

Trinity.

Matthews & Warner at Hayfork are running a tunnel to tap the ledge.

A quartz boulder weighing thirty-five pounds was sluiced out of the Hupp & McMurry, Weaverville, which is rich in gold.

The La Grange Hydraulic Co., a French corporation, is operating on 3174 acres four miles from Weaverville. The gold-bearing gravel varies from a few feet to 300 feet in height. A canal system 14½ miles long, 7 feet on top and 4½ at the bottom, 4 feet deep, carries the water during the summer, conveying 60 cubic feet per second.

To secure a permanent water supply during the winter season Rush creek and Stewart's Fork are being connected by a 9000-foot tunnel through the mountain, which will be completed about March.

Tuolumne.

(Special Correspondence).—On the Harriman the new hoisting works are completed. Sinking has reached 100 feet and will be continued to 400 feet before crosscutting is begun. F. C. Wilmans is superintending work on the Harriman, the Old Bonanza and the Rose Creek properties, making his headquarters in Sonora.

Jamestown, Jan. 10 '98.

A carload of ore shipped from the Black Oak yielded six ounces of gold and eleven ounces of silver per ton.

Six veins traverse La Estrella ground ranging from 12 inches to 12 feet. Assays from the main tunnel run $1.13 to $2.45, with 6 per cent sulphurets that go from $29 to $30 per ton.

Ventura.

Fires were started recently in the furnaces of the California Asphaltum Co., having been shut down three months to make extensive improvements.

Yuba.

The supervisors have established the water rates for the county for '98 as follows: For irrigation purposes the rate shall not exceed ten cents per cubic inch under 6-inch pressure, miners' measure, and for ditches and corporations owning their own water the rate shall not exceed the sum of fifteen cents per day under the above-stated pressure. For persons or corporations having to purchase water for the purpose of selling the same, twenty-four hours shall constitute a day, and for milling purposes twelve and one-half cents per inch per day and for mining purposes twelve and one-half cents per inch per day.

NEVADA.

(Special Correspondence).—D. H. Jackson of California, has deeded to the Holmes Mining Co., controlled by a London corporation, 160 acres of land, covering the townsite of this place, and upon which the railway depot is situated, together with the two Northern Belle mills, and tailings to the amount of about 250,000 tons. The assay value of these tailings is conservatively computed at $1,250,000.

Belleville, Jan. 9th, '98.

The Piocho *Record* says that J. E. Peck has returned to Bullionville. The last car of machinery was received there about two weeks ago. The Bullionville mill has been entirely remodeled. It now represents one of the concentrators of the Peck Bros. The particular method of treating ore by this process is secret. It is estimated at a capacity of 20 tons a day. The changes in the mill have involved an outlay of $30,000.

At Silver City, the Oest, Haywood, Success, Santiago and Canyon mines are all looking well. A clean-up from the Oest netted $15 per ton. The Canyon has a ledge of ore that mills $12 per ton.

Midgley, Roberts & Moran have relocated the old Cooney claim, twelve miles from Sutro, and given it the name of Lizzie mine. They have a 2-foot gold ledge that horns well.

Reports say that the Dumontelle is proving a valuable property. The ledge is 3 feet, and the ore mills $35 per ton.

The average output per week in gold from the Olinghouse mines, in Washoe county, is about $400.

Proctor & Norris are developing the Ore. The cold weather interferes with the mining.

Quinn & Taylor are running a tunnel at Olinghouse that will cut the ledge at 200 feet.

The Broncho shows 34 inches of low-grade ore.

To drain the Comstock and resume deep mining thereon would awaken a waning interest in the old bonanza that, unless something is soon done, will result in inanition.

The Yerrington *Rustler* says that F. J. Huffaker placed an attachment on the Peck mill at Dayton; the property is in the hands of the sheriff of Lyon county. Mr. Huffaker was acting in behalf of J. Douglass, to whom it is said the Pecks are indebted in the sum of $44,000.

OREGON.

The $750,000 deal for the Bonanza mine, near Baker City, is off. This deal involved a commission of $250,000, said to be the largest ever carried by a mining sale in the Pacific Northwest. The collapse is the result of a lawsuit over the division of the commission. The Bonanza mine was the property of the Geis

estate. Geiser gave an option on the mine for $500,000 to H. L. Phillips, who carried the property to New York and negotiated a sale for $750,000. The New York men bought the mine, paying $50,000 down. The New York buyers hesitated in the payment of the deferred installments on the purchase price. When the day had passed for the second payment, Geiser declared the deal off. He now says that the mine cannot be bought for less than $1,200,000.

Niven & Co. discovered a 3-foot vein of high grade ore three and a half miles above Granite.

Rich ore is being taken from the Mocking Bird, near Union. The average paid each day is $20. This rock is worked in a hand mortar and washed with the pan.

The *Republican* reports that the Crystal Palace group, at Union, has been sold to C. H. Thompson for $125,000. This mine has 3000 feet of tunnels.

At Baker City the Virtue mine is about to resume operations.

Supt. Turner of the Esmeralda group, Baker City, has started his mill. He has struck high-grade ore that had been overlooked by former operators.

A shipment from the 97 shows that the property is a high-grade proposition. The ore netted about $100 per ton.

Ten tons of ore from the Free Coinage, near Ashland, produced twenty-one ounces in gold. The concentrates went $150 per ton. The ledge is 3 feet.

W. H. Reed has purchased the Hammersly mine, southern Oregon, and is pushing work. The ledge is 2½ feet; the rock runs $75 to the ton.

W. J. Stanley has bonded the Homestake at Woodville to J. E. Frick for San Francisco people for $5000, and they will begin at once to develop it.

The first payment of $5000 on the purchase price of the Ashland mine was made Jan. 3rd.

The ledge on Browning & Hannum's mine is 2 feet and the ore averages $15.

P. Scheringson has a 70-foot tunnel near Grant's Pass on a 16-inch vein of $150 rock.

Samuel Barton and others propose to put in a copper refining plant at Portland, two stacks, each of 200 tons capacity.

WASHINGTON.

The Comstock M. Co. of Colville has begun work on Clugston creek. Supt. Earnest expects to be shipping the first of February. The character is silver and lead, with a small percentage of copper.

BRITISH COLUMBIA.

(Special Correspondence). — Twenty men have gone to Phillips Arm to do active development work on the Annie Laurie mine. Nothing more is heard of the proposed smelter. It is needed on the coast, as a large number of mines in Phillips Arm district, Alberni on Vancouver Island and among the Gulf Islands are being developed and the order sent at great expense to American smelters.

The Golden Cache, advertised in America and England as a high grade $50 proposition and sold in large lots as high as $1.80 a share, is being offered all the way from 15 to 40 cents. Some 745 tons put through the mill went $3.10 per ton in gold. A large number of shareholders, however, will not sell their stock at present at any price and others are buying it in at the low prices from motives and suspicions usually prevailing in a case of this kind.

The Orphan Boy mine is again heard from. It will be remembered that the manager of the Orphan Boy Company was accused of fraud in selling the mine on a judgment which it is alleged was acquired for a purpose, and so defrauding the shareholders, who got next to nothing. The case was thrown out in the courts and the parties who bought the claim—experienced company promoters—have added other claims to the Orphan Boy group and are forming a syndicate to operate them. Although the former Orphan Boy Company went to the wall through bad management, it has always been conceded that the claims are excellent free-milling propositions. The Channe Company, who sold their numerous claims on Phillips Arm to the Gold Fields of British Columbia for 30,000 shares of one pound Gold Field of B. C. stock, guaranteed par, and $10,000, and purchased more claims in Kootenay, are reducing their stock from $1,000,000 to $250,000, pooling the present issue and issuing treasury stock at 25 cents par. They are selling their Gold Fields stock in England and as the proceeds come in they propose to pay dividends to the shareholders from it and take the proceeds of the treasury sale for development. GOODMAN.

Vancouver, B. C., Jan. 10th, '98.

(Special Correspondence).—The stamp mill on the Morning Glory makes its first clean-up on the 10th. The first payment on the Monashie mine has been made. The deal on the Bon Diablo has fallen through, but may be resumed in the spring. Work on the Density has been discontinued for the present, awaiting instructions from London. The tunnel on the Blue Jay is 160 feet long, but they have not yet struck the lode. Camp Hewitt is looking well and great hopes are held of good results being obtained in the spring.

The sale of the Great Western at Rossland to the British American Corporation was completed last week. The deal was made on the basis of $101,000 for the property. Of this $50,000 was cash and $45,000 payable April 4.

The mining deals and options at Rossland within the past 60 days amount to not less than $6,000,000, and involve some of the greatest properties of the Trail Creek district.

The Mckintosh syndicate last week purchased the Surprise claim for $30,000 cash. They also obtained a bond on the Red Mountain for $100,000 and made the first payment of $50,000 on the Great Western.

Work will be resumed on the White Bear at Rossland, and on the Oregon group in Waterloo camp. A body of low grade ore has been encountered in the Jumbo at Rossland. The British Canadian G. F. Co. will erect a concentrator near Lemon Creek townsite in the spring. The average wages in Rossland are $3 per day; in the Slocan the miners are paid $3.50.

A strike of a 2-foot vein of rich ore is reported on the Golden Wedge, in Slocan district. A contract has been let for a big mill for the Joe Dandy, in Boundary district. Mayor Wood of Greenwood City has acquired W. W. Gibbs' interest in the Snowshoe claim for $45,000. In sinking the shaft from the 600 to the 700-foot level in the Le Roi, the workmen unexpectedly came into a 4-foot ore body which assays from $40 to $60 per ton.

ALASKA.

E. O. Lamphere and M. P. Gilbert, of Chicago, Pres. and Sec. of the Free G. M. & M. Co., have been examining the property they purchased recently at Berner's Bay, with a view to laying out proposed developments. The condition of the bond on this property is that within a year extensive developments shall be prosecuted and a 40-stamp mill built.

The Free G. M. & M. Co., of Chicago, is operating the Snelp property at Snettisham. Seven men have been working for two months opening up the ledge. The intention is to build a mill.

THE KLONDIKE.

More than the ordinary assortment of fairy stories come from the Klondike this week. The "mother lode" has been found, "mountains of quartz" and granite, "assaying well up in the thousands," as usual. The Rothschilds are going to build a railroad over the Dalton trail, 400 miles long, to cost $8,000,000. Several millions in nuggets are stacked up in the Alaska Co.'s Dawson City store for shipment. Returning miners confirm the statement that while provisions are scarce and dear at Dawson, there are no cases of starvation.

A. McDonald, Government engineer in charge of the geological survey of Alaska, reports to the Government that the gold fields on the American side of Alaska are probably more extensive and richer than the Klondike gold fields on the British side and that Americans can reach the Klondike by way of the Copper river in twenty-five days.

UTAH.

J. P. Turner, Supt. Last Chance, Bingham, expects to make his initial run within twenty days. Since the wiping out of the old plant by fire, the work underground has gone on. He has 1000 tons in the yards and 3000 tons blocked out below. The ore averages 14 ounces silver, 7⅛ per cent lead, and gold $1.20 per ton.

The Connor, Wonder and East Golden Gate, idle a long time, are being developed under the management of Mr. McFarlane.

Assays on the Jordan and Galena show 45 per cent lead, 60 ounces silver and a half ounce in gold per ton.

On the Mammoth, at Tintic, the 60-stamp mill is running constantly, and considerable high-grade ore is shipped.

During 1897 the Sacramento mine marketed gold cyanides valued at $88,678 16, paid dividends and expenses amounting to $69,795.20, and has in the treasury $18,887.96.

Smuin Bros. have uncovered a 40-foot vein in the Lake mountains on fifteen claims that averages $2 per ton in gold.

The Blue Bell, at West Tintic, has uncovered ore which assays 45 per cent lead and from $1.60 to $4.20 in gold. They have drifted on it a distance of 10 feet, the body continuing to increase as the work advances.

T. G. Merrill, of Salt Lake City, has bonded a portion of the West Dip, at Mercur, to Butte, Montana, people for $50,000, and requiring the sinking of 1000 feet of shafts.

IDAHO.

In high water, the antimony mine, at Kingston, has always been flooded, through broken ground near the surface. To overcome the difficulty, the shaft has been cemented, and it works to perfection.

C. H. Sheu and associates, who secured a bond on the Cannon group, have also acquired the Golden Gate Extension group of five claims. The property is equipped with a steam hoist and a double compartment shaft to a depth of 110 feet. According to the agreement, this shaft is to be sunk 600 feet further, unless ore is sooner encountered, and a force of ten men is to be constantly employed. The bond runs for ten months and calls for $160,000.

The Geyser-Marion shipped 500 pounds of gold cyanides last week.

The Potosi mine, at De Lamar, has been leased for one year by T. W. Drew, who is retimbering and cleaning out the tunnel. The mine has been a valuable producer.

The owners of the Coffee gulch property are continuing development work; they will soon cut the ore chute in the lower tunnel. The vein is one of the largest on Florida mountain.

MONTANA.

The Hope Co. contemplates improvements and extensive exploring work.

The Bimetallic concentrator at Granite is in continuous operation.

Dr. Mitchell's claims at Garnet have been leased to Ramsdell, Gilna & Co., who contemplate the erection of a cyanide process.

The Royal Gold at Philipsburg has struck another chute of good ore and started the mill January 1.

Johnson & Co. are making money out of the Last Shot mine at Basin. They have 25 feet of concentrating ore and took out $2400 in eight days.

On the Grey Eagle, near Basin, Holmes & Dolman are extracting five cars of ore a week.

The Heart Solo at Madison was bonded recently to A. Fisher, who is said to be representing Col. Chisholm of Bozeman, for $8000.

P. A. Largey bonded seven claims near Madison for $6000. W. Porter has charge.

Sloss, Moore & Co., operating the German Bar placer mine, have acquired an additional 1000 acres. A dredging plant will be put in operation.

T. G. Merrill of the Merrill-Miller M. Co., on which work was stopped over a year ago, owing to a strike, is arranging to start up the mine. The property has produced $400,000 within the last four years.

Butte *Miner*: The Montana Ore Purchasing Company is steadily hoisting 650 tons of copper ore every twenty-four hours from the Rarus and the Glengarry mines, most of the ore coming from the Rarus, notwithstanding the fact that the courts do not permit Mr. Heinze and his associates to take ore from the portion of the Rarus now in litigation between the Montana Ore Purchasing Company and the Boston and Montana Company, in consequence of an injunction issued at the time the original suit for over half a million dollars damages was filed by the Boston people for ore alleged to have been extracted from the lower levels of the Pennsylvania mine through the workings of the Rarus.

The Anaconda Mining Company is reported to be shipping to its smelter over the Butte, Anaconda and Pacific Railway 215 cars of ore a day. Each car is approximately loaded with 58,000 pounds of ore, in round numbers 6000 tons taken from the mines each twenty-four hours.

WYOMING.

The Wyoming R. & C. Co. at Hartville is preparing to commence operations on the Sunrise, a copper-iron claim. It has 20,000 tons of iron ore, containing from 2 to 5 per cent copper, on the dump, the result of former operations. It is thought this can be utilized at a profit as a fluxing ore in the Denver smelters.

The coal production of Wyoming for '97 was 2,663,133 tons.

SOUTH DAKOTA.

The Big Four M. & M. Co., at Central City, is crosscutting the formation at 500 feet depth. Four shoots have already been cut. J. W. Dalby is the manager.

MICHIGAN.

The mineral output of the Franklin mine for December was 152¼ tons, compared with 153 tons for November and 156¾ tons for December, 1896. This makes 1791¾ tons for the year 1897, against 1684¼ tons for 1896.

TENNESSEE.

English capitalists have concluded negotiations for the purchase of the coal mining properties in Eastern Tennessee and will pay for them about $5,000,000

COLORADO.

Development is being pushed on Golden Island No. 2 at Salida. The shaft is down 50 feet with a well defined vein.

On Golden Island No. 1 the vein matter is 4 feet.

The Crete, at Turrett, has attained 50 feet and has a foot of ore assaying $30.

Within the next six months the Aspen district will see in operation seven concentrating plants with the possibility of an eighth. Four will be for custom ores, while the others will handle the output of the Smuggler, Mollie Gibson, Argentum-Juniata, Farrell and Little Annie properties. The Smuggler has about completed its new plant and the Argentum-Juniata-Mollie Gibson joint mill is well under way.

Work is being pushed on the Standard tunnel under Beacon hill. The bore is in 1200 feet, and is near the Orizaba vein. It is backed by the Standard Oil people.

The Colorado Fuel & Iron Co. has 450 men employed in rebuilding its steel plant at Pueblo. A large portion of the old structure has been taken down and the new structural steel is being put in position.

The Ward Railroad Co. has bought a large tract of land surrounding Owen Lake, four miles from Boulder, and proposes establishing a town which will be known as Culbertson. Work has been commenced on the erection of a large reduction plant by the company, which will also build railroad shops in the spring. The reduction plant will cost $100,000 and will have a capacity of 250 tons per day.

Ore shipments from Ouray for 1897 amounted to 3076 carloads.

The Iron Camp, at Saguache, has a contract for shipping 1100 tons of ore daily.

In 1897 San Juan county produced 165,000 tons of ore of a total value of $1,955,453. Operators in this county have things down so fine that a profit is realized on $7 ores.

The Commodore Co., of Creede, have increased their output to 125 tons a day. All low grade ore is being left in the mine.

The Mt. Rosa M., M. & L. Co. gave a bond for $250,000 to J. A. Connell on the Gold Coin, at Victor. The lease runs eighteen months; the royalties are 25 per cent.

The output of the American, in Ouray, has been considerably over $1,000,000. It employs the year round from sixty to eighty men and has a large electric plant.

At Leadville, the Pyrenees shaft on the New Year's mine has reached 750 feet.

The Nettie Morgan, near Leadville, makes steady shipments.

The Seneca, of the Pittsburg, is shipping thirty-five tons per day.

The old Gallagher, on Iron hill, one of the first finds in Lake county, continues a producer, shipping 1500 tons of oxidized and sulphide ores.

Nearly 100 tons of iron and silver bearing ores are shipped daily from the Matchless and Duncan mines, Leadville.

The Catalpa and Crescent, at Leadville, the heaviest shippers in the district, output 250 to 300 tons per day of manganese iron.

The Congress, at Silverton, is shipping twenty tons daily of copper ore. The ore will average 20 per cent copper, 25 ounces gold and 30 ounces silver.

On the Silver Ledge mine, near Chattanooga, under the management of M. Anderson, extensive development has been carried on, and high-grade ore encountered.

After expending $200,000 to locate pay mineral at a depth of 1200 feet, the Free Silver, at Aspen, has suspended operations.

The Resurrection, at Leadville, averages for the last ten days eighty tons a day.

Fifty tons per day is shipped from the Sedalia.

The ore purchases at Georgetown for 1897 amounted to 928,012 ounces of silver, 1797 ounces of gold, 38,310 lbs. of copper, 995,531 lbs. lead, of which the total cost was $521,-263

E. W. Thompson has purchased the Poor Woman mine at Sunset for $10,000.

The Jason lease, Leadville, is averaging 40 tons per day of iron.

The Mab shaft has reached the 1000-foot mark.

The Elk mine on Carbonate hill is shipping a fair grade of iron.

The Portage M. Co. at Telluride owns eight claims. The general average of the ore is from $50 to $75 in gold and silver. The company contemplate building a concentrating plant.

The Invincible G. M. & M. Co., near Rico, is preparing to work on an extensive scale the coming season.

The Pactolus G. M. & M. Co. has made the first of a series of regular shipments of high-grade gold ore.

NEW MEXICO.

The Golden Treasure, in Taos county, shows five leads varying from one to ten ounces per ton. At the Stella, the values average from three to four ounces per ton. The Maud M. has a vein of $25 ore, carrying gold, silver, copper and lead. The Great Western, on Black mountain, averages $25 per ton. Work will be pushed all winter. The Ajax, in Red river, has cut a vein of gold and copper, which runs about $20 per ton. The total ore output of the Hillsboro mines during 1897 was 9304 tons. Linder & Crumrine, Snake mine lessees, are occupying the Porter mill with 150 tons of $35 ore. John Buttecke is sinking on a 5-foot chimney of gold ore in the Freiberg, at Hillsboro. J. L. Doran has taken a lease on the Graphic, in the Hadley district, for one year. Ore has been developed on the fourth and fifth levels.

Work has begun on a smelter at Santa Rita. The company is shipping two cars of iron per day.

Another strike of copper bearing iron ores has been made on the Mimbres mine. A shipment made last week gave returns of 18 per cent silica, 54 per cent iron, 6.8 copper, 8 ounces of silver and $1.20 gold per ton. This ore was taken out in sinking the new shaft which has attained a depth of 45 feet.

J. B. Gilchrist continues to extract rich copper ore from the Guadaloupe and Chino mines. The Oxide is producing ten tons per day of 20 per cent copper ore.

Crawford & Derbyshire, st Silver City, sold 461¼ tons of concentrates, produced from the tailings at the Pacific mill.

G. W. Stoneroad will deliver 50,000 feet of timber to the Old Abe mine, at White Oaks.

The Percha & Rex mine, in Hillsboro district, shipped thirty tons of lead ore.

J. C. Bender bonded the Gilbert & Brown property, at San Pedro.

The Old Abe shaft, at White Oaks, is 755 feet.

At the Madrid coal mines, Cerrillos, there are 400 employes, and the monthly payroll averages $15,000.

In Red River district there are twenty-five properties that have from 85 to 300 feet of work done. The ores are sulphide, hematite and manganese, and can be treated by concentration.

C. F. Potter entered for a Colorado company at the U. S. land office in Santa Fe 147½ acres of placer ground in Taos Co.

ARIZONA.

The Springfield M. Co., near Peeples valley, are finishing their 10-stamp mill. There are 200 tons of high-grade ore on dump. Their Monte Cristo shows a ledge 2½ feet of $40 gold ore, of which $10 is free gold and $30 in the concentrates.

The U. P. mine at Peeples valley shows 4 feet of $31 ore.

Wilson, Wood & Scanland have bonded six copper claims in the Chiricahua mountains, near Tombstone, to an English company for $50,000.

A block of onyx weighing 9500 pounds was shipped East from the Big Bug quarries near Phœnix.

Gov. McCord has invited those interested in mines and mining in the Territory to meet at Phœnix on January 25th for the purpose of forming a mining association. The Governor, in his address, says "this call is without authority of law, but, as nearly all Western States have such an organization which has resulted in much benefit to the interest, I have taken the liberty to take the initiative by issuing this call."

At a depth of 375 feet water has been encountered in the Commonwealth mine at Pearce. The flow is so great that a pumping plant will be put in.

The Fitts Copper Co. in Cochise Co. have decided to order a smelter of thirty tons capacity. The Gold Cliff Co. will put up a 10-stamp mill within sixty days. The Golden Rule Co. contemplates the erection of a mill also.

MEXICO.

Two Republics reports that the output of mines in Monterey is increasing. The Mina del Agua are producing forty tons per day. This ore is treated at their concentrator in Cerralvo. The zinc is shipped to Europe. The mines worked in the Cerralvo district are the Refugio, Purisima and Barradon. They belong to F. Armendaiz, and are producing thirty tons per day. The San Pedro mines are sinking shafts.

The Bornio M. Co. at Las Planchas shipped four bars of silver bullion, 975 fine, weighing 6000 ounces.

Mechanical Progress.

American Locomotive Builders.

The following letter, signed Angus Sinclair, editor *Locomotive Engineer*, New York, recently appeared in the London *Times* and has attracted attention:

Within the last week American locomotive builders have received orders for fifty-eight locomotives from foreign countries, making a total of about 200 orders for locomotives placed here within six months for foreign account. A considerable part of the engines are for European railways. Most of the contracts were bid for by British locomotive builders, and Americans received the orders because their prices were the lowest submitted. This seems to indicate that British locomotive builders are rapidly losing their hold of foreign markets. It might be edifying to your readers to learn how Great Britain is losing a line of business of which she held a practical monopoly only a few years ago.

To obtain a clear idea of the causes which have pushed the United States to the front in the manufacture of locomotives and other machinery, it is necessary to look back a little more than a century when Eli Whitney, inventor of the cotton gin, introduced into armory work a system of interchangeable production of parts. Before his time every part of a gun was made to fit that particular gun and would not fit any other. Whitney devised a plan of making every stock, lock and barrel exactly alike. The parts were finished in formers, jigs and templates, and then all that was to be done to produce a finished gun was to assemble the parts together.

The system was new and strange, and therefore worthy of being regarded with suspicion, and Whitney was looked upon by many as a fanatic, and his system made little progress for a few years; but self-interest is more powerful than conservative notions. Skilled labor was always dear in this country, and after a time the men in New England who were striving to keep alive the infant mechanical industries turned to the Whitney system as a means of lowering the cost of production to meet outside competition. The clockmakers of Connecticut were the first to adopt it extensively, and they worked it so successfully that a few years afterwards they were sending their clocks into every foreign market of the world and underselling the cheap labor of Europe. Sewing machine makers, airbrake makers, and other makers of small articles of common size followed the example of the clockmakers and profited accordingly.

The interchangeable system of production is better adapted to small article than to large pieces, and it made slow progress into the shops where heavy machines were constructed. Twenty years ago makers of small engines were turning out engines that had parts as exactly interchangeable as parts of a sewing machine, and gradually the system was making its influence felt in locomotive work. Great difficulty was felt in adapting the Whitney principle to locomotive building, principally because there is so much diversity in the parts of the locomotives ordered by railroad companies, but some of the brightest railroad engineers of the country were for years wrestling with the problem, and a system of production was worked out which reduced the cost to surprisingly low figures.

From the incipiency of the interchangeable system of production it was found most satisfactory to do the work by the piece in preference to day labor. American workmen are so much accustomed to piecework that very little sentiment exists against it. This work has encouraged mechanics to devise and improve tools and perfect methods for doing the work, and the extraordinary low cost of labor on some machines has resulted from the use of ingenious tools produced by workmen and patented by the inventors. Another influence it has is to make men in charge of a shop keen to see the merits of any new tool. When a machine tool has been put upon the market which promises to reduce the cost of production the men in charge of every first-class machine shop proceed to see whether it would pay to throw out a good tool to make place for the latest article. They generally decide to purchase the new tool. An expression is often heard among our locomotive builders, "We cannot afford to use worn-out tools." From what I have seen of the shops of our competitors abroad I think the prevailing policy is, "We cannot afford to buy new tools."

These are the influences which are giving the United States locomotive builders the markets of the world. The grim principle of supply and demand calls for cheapness, and our locomotive builders are in a position to undersell all competitors, just as the Connecticut clockmakers did three-quarters of a century ago.

Nine years ago the writer make a tour among the principal locomotive building shops of Europe, in company with the manager of one of our largest locomotive works, and we naturally were comparing shop methods as followed there and with us. We were aware that, when a foreign order for locomotives was awarded to an American firm when British builders were bidders, the British engineering press howled that the use of inferior material enabled Americans to undersell their British rivals. We were anxious to find out the truth of the matter and took notes.

On returning home the writer was constrained to publish in his journal an article to this effect:

In spite of the low wages paid to skilled mechanics in Glasgow, the cost of building a locomotive there is considerably higher than it is in the United States. When Bret Harte was American consul in Glasgow one of his reports to our Government brought this fact out very decidedly, but the accuracy of his conclusions was questioned by those concerned in defending British interests. We recently secured information which corroborates the correctness of Consul Harte's conclusions. One of the leading Glasgow locomotive builders built 200 locomotives last year, while employing on an average 2500 workmen. A well-known American firm in the same time built 300 locomotives, while employing 1400 workmen. Allowing 300 days for a year's work, the American firm put the labor of one man for 1400 days on each engine finished. The Scotch builder, on the other hand, put the labor of one man for 3750 days on each locomotive turned out of his shop. The weight and power of the American locomotives greatly exceed those built at Glasgow.

That was a statement of facts which ought to have received attention from those interested in conserving British trade. Did they accept it in the spirit that begets progress? Not at all. The leading British engineering journals denounced the statement and said that it was a parcel of Yankee lies. Since that time American locomotive builders have been steadily reducing the man-days necessary to finish a locomotive, and British builders have remained almost stationary. The large foreign orders that have come to American locomotive builders is the beginning of the end that will see British locomotive builders out of the foreign market.

Among recent orders placed in the United States are eighteen locomotives for the Grand Trunk Railway of Canada. There is at Kingston, Ontario, locomotive works that could build all the locomotives used in Canada if they were properly equipped and operated, and they are protected by a tariff duty of from 30 to 35 per cent ad valorem on all locomotives imported; but the United States builders underbid them on almost every order, although wages are lower and living is cheaper in Canada than they are in our industrial centers. Why is this thus? It is because the Kingston locomotive works are controlled by a firm in Scotland, which "cannot afford to buy first-class tools" or undertake the expense of reorganizing the shops to work on American methods.

In a newspaper controversy about the rights and wrongs of the engineering strike going on in Great Britain I have repeatedly seen the statement made by workmen that if their trade is driven away from the British isles they will follow it. Should they follow it to America they will have to greatly change their ways to secure steady employment. Instead of an eight-hour day they will be glad to remain in the shops fifty-six or sixty hours a week. If they object to attending to as many machine tools as other mechanics operate, they will be sent to the office for their time check. If they happen to be employed on day work, which is necessary in a few departments, they will find that they cannot push a file or wield a scraper with deliberate leisure. They will find a foreman in evidence who has a habit of saying, "Do you intend working all week on that two hour's job?" When he gets thoroughly drilled into the habit of the ordinary American machine shop he will understand why the keenest observers say that, while paid the highest wages in the world, the labor of the American mechanic is cheaper than that of any other workman.

Electrical Progress.

Nicola Tesla's New Engine.

Tesla says that coal will not play so important a part in producing the power of the earth as wood does now, and shows an invention of his in the experimental stage, about which he declares that there is no possibility of its failure. He declares that the apparatus is so simple that the least learned in mechanics can comprehend it, and if it were fully described others might seize his idea, patent it, and control a blessing which he intends shall be a free gift to the world. This is so extraordinary, so totally at variance with established customs, that it is almost as unbelievable as the discovery itself.

In the center of a large room with a glass roof Tesla will place a huge cylinder of thick glass on a bed of asbestos, supported by a firm stone pedestal placed in the center of the room. The circle will be laid lengthwise, and will be surrounded by a circle of mirrors covered with asbestos coats to refract the rays of the sun into the glass cylinder. The cylinder will always be kept full of water, which will have been treated by a secret chemical process, which Tesla claims to have devised, and which, he says, is the only complicated part of the discovery. All day long, while the sun shines, its rays will be refracted into the glass cylinder. The chemical treatment makes the water easily susceptible to heat, and in a little while the vaporizing begins. The steam thus in the cylinder is carried to a steam engine of the ordinary description. The engine in turn will generate electricity, which will be stored and transmitted by cables to the factory and the home. The power house will store sufficient electricity to meet all demands during the time that the sun does shine, although it may be clouded over for weeks at a time. "Most people will contend that the plan to harness the rays of the sun and make them operate the machinery of man, and to give light and heat, is the idle fancy of a dreamer," said Tesla. "I would indeed be surprised if they were to contend otherwise. There has never yet been proposed a single great scientific enterprise that has not at first been met with ridicule and laughed at as something beyond the bounds of possibility. Every one will remember the days of horse cars, when electric street railways were first talked about as possibilities. The suggestions of cars running along the streets without horses in front of them was laughed at. But now people have trolley cars running in villages where, a few years ago, horse cars were considered too expensive, and they pay no more attention to the marvel they witness every day than they do to an express wagon rumbling along the same street. It will be the same with the motive power generated by harnessing the rays of the sun. The first two months that the generating stations are in operation they will be places of intense interest, but after that people will think no more about them, except as places of business. They will regard them as little as they do gas tanks, electric light plants or water reservoirs. They will simply suggest monthly or quarterly bills, such as they now pay for water or gas, except that the bills will be much smaller. I do not care at this time to go into details. I have not yet begun the practical part of the work. I wish to have the experimental part so completed that no one can stick a pin into it. But I will say that the results so far achieved are all that I could desire, and they place all possibility of a failure beyond the shadow of a doubt. I am certain that the new apparatus will come into speedy and general use. Its cost is so insignificant that it cannot be ignored. After the apparatus has been placed in any station there is absolutely no expense in running it for years, except the salaries of engineers and the small cost of the wear and tear of the apparatus, which will be eventually anything but expensive. The whole business will be so simply arranged that there will be no probability of its breaking down; but even if it should happen that one station would be useless for a short time, the immense amount of electricity always at hand—for it will cost practically no more to generate 5000 volts than to generate so many million volts—will bridge over the difficulty. There would be nothing to prevent the generation of a whole year's supply in case of an accident in the generating machinery. There is nothing unnatural in the proposition to have the sun drive the machinery of the earth and, indirectly, to heat and light the planet at night as well as by day. It is a great deal less artificial than for men to delve down into the bowels of the earth at so much trouble and loss of life in order to get a few handfuls of coal to run an engine a short time and then to make spasmodic return trips for more. As to the proposition to have each city look after the heating and lighting of the homes of its inhabitants, there is nothing more extraordinary about it than the present system of cities supplying water pipes and sewers and private companies supplying steam heat, gas light, electric light and motive power." All of which has been said before.

Deflection of the Magnetic Needle.

Experiments that have been made by Russian and French savants in connection with the remarkable deflection of the magnetic needle over an immense area in central Russia have given curious results.

The observations were confined to the strip of country between Moscow and Kharkov, a distance of about 850 miles. The needle showed the greatest aberrations in the province of Kursk, where in the north it was deflected 20°. One hundred and fifty miles southeastward the deflection exceeded 96°, the needle pointing east and west instead of north and south.

Engineers who are engaged building railroads in that part of the country are much interested in the experiments. They speculate as to how the magnetization will affect the durability of the rails.

It is known that rails are usually more durable when laid north and south than in other directions, the greatest wear from magnetism being when they are laid due east and west.

EXPERIMENTS have been made by chemists in the hope of discovering some process of giving greater tensile strength to electrolytic copper, but so far the results obtained have been of a negative character. An experiment of this kind was made at Dollar bay,

Michigan, a year ago, when several carloads of Montana copper were received at the plant of the Tamarack-Osceola Manufacturing Co. Every effort was made to secure good results from the western copper in its course through the wire drawer mandrils, but unsuccessfully, there being the usual difficulties met with because of the lack of cohesiveness—a marked characteristic of Lake copper—but which is lacking in the metal when secured by its precipitation through the use of the electric current. Further tests have since been made, but the results so far secured are not encouraging.

MERCUR, Utah, will soon have electrical power and light. The Telluride Power Company have their work completed. The Salt Lake Electrical Power and Light Company is pushing its project, which derives its energy from the Jordan river, and work will soon begin on the pole line of eighteen miles from the Narrows to Mercur. A 5600 H. P. plant is being put in, and the 15th of March is the time set for its completion, when it will also furnish power and light to Bingham, twelve miles away. The wire, poles and machinery are now on the way, and work at the Narrows goes on in preparation for the machinery. Four 72-inch pipes, each 340 feet long, will convey the water into the turbines, and 1000 cubic feet per second will go through them. Seventy-five feet fall will be developed, which in reality is but 55 feet, as a draft tube will raise the water from the river 20 feet, acting as a syphon. The power will go over a No. 4 wire, and it is said only about 5 per cent of it is lost in transmission.

THOS. A. EDISON JR. is credited with announcing that he can photograph thought. Nicola Tesla tells a New York paper that he has "harnessed the rays of the sun" and will compel them to operate machinery and give light and heat. This invention is still in the experimental stage, but he declares that there is not a possibility of its failure. He has discovered a method of producing steam from the rays of the sun. The steam runs a steam engine which generates electricity. It is probable the dailies have distorted the utterances of these electricians, who usually let results attest the worth of their efforts.

THE Artesian Water Works Co. of Alameda, Cal., is considering the bringing of a suit against the Alameda, Oakland & Piedmont Electric Railway Co. to compel it to take steps to prevent damage being done to the former's water pipes by electricity escaping from the rails. No similar case has been carried into the California courts before. Supt. Borden of the Water Works says that the escaping electricity so injured the pipes that they have to be replaced at short intervals.

Colorado's Gold Output.

TO THE EDITOR:—The output of gold for 1897 is an interesting study for the business world generally. It is encouraging to note the success of capital invested directly and indirectly in mining pursuits. The laudable ambition displayed by the States seeking to surpass each other in the product of the mines is worthy of comment.

Colorado has asserted that her output for 1897 exceeds that of California for the same year. But is it not a fact that in this output claimed by Colorado much, if not all, the gold produced by New Mexico, Arizona, Mexico, and even some from California, is computed? The natural channels for marketing the gold of the places named, including a part of California, would be Denver, and, consequently, Colorado credits it to her own account. Is this idea correct? A. T.

Grass Valley, Jan. 10th, '98.

THE accurate determination of the atomic weights is shown by Prof. F. W. Clarke to be a matter of real practical importance. The atomic weight of chromium is still placed by European analysts at the old determination of 52.5, while American chemists have adopted the corrected value of 52.1. A result is that chromic iron, which is imported by the Baltimore Chrome Ore Works in cargoes of about 2500 tons, is valued by Glasgow assays at $367.50 per cargo more than Baltimore assays.

Scientific Progress.

Pseudo-Science.

To what extent are men of science responsible for the credulity which everywhere prevails in reference to all matters relating to scientific discovery or accomplishment? This question, says *Science*, is not to be lightly set aside, for the existing condition may well create alarm among all who seriously consider the welfare of science, of scientific men and of the people generally. Several causes have conspired to bring about this condition, two or three of which may be mentioned. To begin with, during the century which is now approaching its end scientific discoveries and their applications have been so numerous and so far reaching as to practically revolutionize conditions of material existence, and they have often been so wonderful in character that it ought not to excite surprise to find intelligent people ready to accept without question announcements of inventions and discoveries of the most improbable and absurd character. Along this line the evil influence of a sensational press is enormous. It was bad enough ten years ago, but it has been greatly magnified by the recent and, on the whole, unfortunate cheapening of processes of illustration to the seductions of which nearly every newspaper in the land has yielded. To this has been added the newspaper "syndicate," by which men who know really nothing of science are employed to furnish sensational articles on scientific discovery, illustrated by sensational pictures, all of which is the more injurious because often founded upon a slender, microscopic tissue of fact. Unfortunately, some men who may be said to inhabit the fringe of genuine scientific activity lend themselves to this sort of thing and are made much of accordingly. Whole pages of this modern journalism are filled with accounts of discoveries that *are going to be made*, for writers of this class are shrewd in taking advantage of the fact that human interest and human memory are now practically restricted to about twenty-four hours in time. The publication of a broadside describing an alleged improvement of the telescope or microscope, in which there is absolutely nothing new that is true or true that is new, adorned with a series of cuts largely imaginary and many of which have no relation to the subject matter, has served the purpose intended when its author has received his pay from the "syndicate," and when the syndicate has scored a triumph in what in these days is called "enterprise." Even the most conservative among men of science are made to appear as willing purveyors of sensationalism by what ought to be looked upon as an unwarranted and illegitimate use of the results of carefully conducted investigations, often before such results have received final consideration and approval at their own hands.

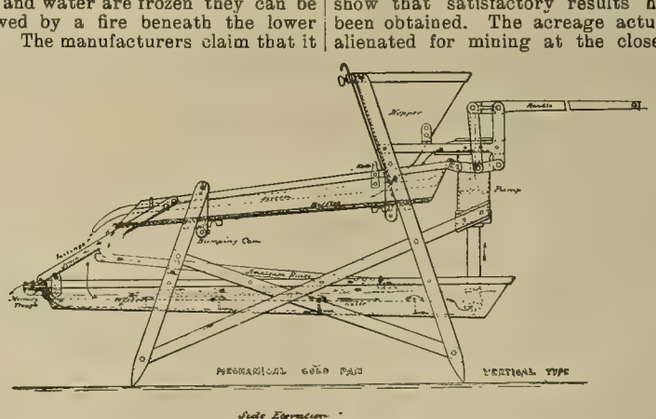
If *all* impressions made by this false popularization of science were to disappear in twenty-four hours the evil would be greatly lessened, but unfortunately there are many very intelligent and thoughtful people, who ought to constitute the best support of scientific work, upon whom they are more lasting. To such the line separating the genuine accomplishments of honest scholarship from the output of sensationalism, which ought to be clear and sharp, is becoming very nebulous, and there is imminent danger of a revolt against the whole thing. The extent to which credulity has been carried was beautifully illustrated not long ago when a widely known scientific man amused himself and many friends by caricaturing, in the columns of one of our standard scientific journals, some of the phases of modern psycho-physics. So perfectly did the burlesque reflect the form and substance of some recent contributions to that science that it was immediately accepted as serious by the large majority of readers.

THE crude materials for the manufacture of carborundum at Niagara Falls are sand, coke, sawdust and salt. These are ready for use except the coke, which has to be ground to a fine powder. The furnaces are built of brick and have the form of an oblong box about 16 feet in length and 5 feet in width and depth. In the center of either end are the terminals, consisting of sixty carbon rods 30 inches long and 3 inches in diameter. The mixture is thrown into the furnace, connection made with the dynamo, and after twenty-four hours the process is complete. The carborundum occurs in the center of the mixture as bright, radiating crystals. In order to prepare the carborundum for the market, it is first placed under heavy iron rolls for the purpose of crushing apart and separating the individual crystals, which are then washed in a solution of acid and water to remove solubles, and finally dried and sifted to separate the different-sized crystals. During the year 1896 the carborundum company produced in round numbers 1,191,000 pounds of crystalline carborundum. Carborundum is used chiefly as an abrasive, for which it is especially well suited, owing to its excessive hardness, which closely approaches that of the diamond.

ACETYLENE may be employed for the determination of copper. The salt to be analyzed is dissolved in water mixed with a little ammonia and heated for a short time on the water bath. Acetylene is then introduced into the dark blue fluid to saturation. The precipitate is complete even in the cold. The copper acetylide is now collected, washed and decomposed by being digested with hot dilute nitric acid, filtered from the carbonaceous residue and the filtrate evaporated to dryness and ignited. The ash is weighed as CuO. For the separation of zinc and copper, as salts of the former metal are not decomposed by acetylene, the method is most useful.

Mechanical Gold Pan.

Herewith is a side elevation view of a placer gold washing and separating apparatus made of steel, which gives a continuous motion to the screen, washer and riffles. But little water is required, and that which is may be reused, as the water is continuously returned from the lower to the upper washing and gold-saving pan. This mechanical gold pan is furnished, as desired, with either rotary or vertical operating mechanism. When the placer dirt and water are frozen they can be thawed by a fire beneath the lower pan. The manufacturers claim that it



Side Elevation.

MECHANICAL GOLD PAN.

can be worked with great rapidity, saving all the gold and concentrates, that it is suited to every climate and all placer deposits, weighing about 100 pounds and easily operated, packed in its own pan with provisions, clothing, etc., skidded and hauled about by one person, rigged up and started in five minutes.

The Parke & Lacy Co., 21 and 23 Fremont street, San Francisco, Cal., are sole agents for this coast. They will have one of these machines in operation at the Golden Jubilee Mining Fair at the Mechanics' Pavilion in San Francisco from January 29 to March 6.

Tin Mining in Perak.

According to the report of the Commissioner of Lands and Mines of Perak, which is a State on the Malay peninsula under British control, the output of tin in 1896 was diminished by two causes—the lower price of the metal and unusually heavy rains. The average price of tin for the past three years has been, commencing with 1894, $37.48, $34.28 and $31.76 per pickul, respectively. This last is the lowest average for six years.

The total weight of metallic tin on which duty was received by the Government, ore being reckoned as containing 65 per cent of metal, amounted to 383,226 pickuls (22,754 tons), being less by 17,720 pikuls, or 1052 tons, than the corresponding figures for 1895. The decrease is chiefly in the weight of the ore, which may partly be accounted for by the Straits Trading Company having called in some of their advances in the Kinta district, the principal scene of their operations. This company is the only European smelting firm in that part of the world. To entirely prohibit charcoal burning, as has been advocated, and to shut down the Chinese smelting *kongsis*, would create a monopoly for this one smelting company, and as that company declines to deal with the lower and more refractory grades of ore, there would be no market for such ores.

The value of tin exported in 1896 was $12,339,877, being $1,713,630 less than the value of the 1895 export. The duty collected was $1,541,052, being $128.038 less than the amount collected in 1896. Owing to the low price prevailing, the government reduced the rate of export duty during the second half of the year. Taking the year through, the duty was equivalent to 12.94 per cent.

Underground mining by means of small shafts, in lines at intervals of about 20 feet on the tin drift, was introduced by Chinese from Australia some four years ago, and has lately obtained considerable development in the southern division of the State. Ages ago this system appears to have been adopted by supposed Siamese miners in Perak. As to tin lode mining, there is nothing encouraging to report at present. The lode at Selibin, upon which a large sum of money had been carefully expended, was abandoned after a year's hard work, and no other tin lodes are being exploited. The Bakit Mass Company started with insufficient capital. It has been reconstructed, and it is hoped that the next annual report will show that satisfactory results have been obtained. The acreage actually alienated for mining at the close of 1896 was 67,553 acres. These figures show that a comparatively small portion of Perak is devoted to mining operations. The report notes that a fall of 15 per cent in the price of tin in two years has been accompanied by a fall in production of 3 per cent only.

Coast Industrial Notes.

—Over 100,000 tons of ice will be stored at Truckee this winter. In some cases it is put up at a cost of 5 cents per ton.

—Capt. D. L. Brainard has awarded to C. H. Frye of Seattle the contract for furnishing 75,000 pounds of bacon at $7.95 per 100 pounds for the Yukon relief expedition.

—The cruiser Chitose, built by the Union Iron Works of San Francisco for the Japanese navy, will be launched next Saturday. This will be a notable event, as it is the first large modern war vessel built in the United States for a foreign government.

—Sixty miles of steel rails for the E. P. & N. E. are in the Ft. Bliss, New Mexico, yards. Nearly thirty miles of the grade is completed, and by March 1st the road will be completed to the Jarilla mining district, thirty-five miles south of La Luz.

—The Southern Pacific and O. R. & Nav. Cos. have advanced passenger rates by rail and water between San Francisco and Portland. For a year the Southern Pacific Co.'s first-class rate between San Francisco and Portland was $10. The new rate is $17. The O. R. & Nav. Co.'s present first-class rate by steamer is $5. This is increased to $12.

—"The story is a pure fake," was what Charles H. Cramp said when shown a dispatch from New York stating that his company contemplated putting $10,000,000 into a ship-building plant at Seattle to undertake the building of war vessels for the Pacific. He added that the Cramp Company has no intention whatever of engaging in the ship-building industry at any place other than Philadelphia.

—Senator Lodge has introduced a bill to provide for the construction of a telegraphic cable from this country to the Hawaiian Islands and Japan, China and Australia. The bill grants a subsidy of $125,000 a year for twenty years on the service to Hawaii and an additional $75,000 a year for the same length of time for the extension of the line to Japan or Australia. A survey by the Secretary of the Navy to ascertain the most feasible route is authorized.

—The steamship Alameda from Australia this week brought nearly 200,000 golden sovereigns, equal to $1,000,000, consigned to the Anglo-Californian Bank of this city. This makes the total gold received during the present season from the same source $12,500,000—a much larger amount than has ever come from Australia as balance of trade in California's favor during the same period of time. Shippers of grain, lumber and canned goods predict a still larger business with Australia for '98.

—The Supreme Court of California has rendered a decision in which it emphasizes the principle of California law that no county, city, town, etc., shall incur indebtedness exceeding in any year the income and revenue provided for that year, and that indebtedness incurred contrary to this provision shall be void. The city of Vallejo made a contract with a San Francisco manufacturer for a certain amount of water pipe, which was delivered and paid for with the exception of $90.85, the special fund for that purpose and for the year being exhausted. The firm sued the treasurer, who demurred on the ground mentioned, which was sustained. The San Francisco man appealed, but the Supreme Court affirmed the judgment of the lower court.

—It is alleged that the builders of the railway from Kramer to Johannesburg, Cal., intend to build to the borax mines, sixty miles distant, and thence fifty miles farther to make a connection with the Carson & Colorado Railway at Keeler. In this regard it is noted that the owners of the Johannesburg road are intimate in the interests of the Vanderbilt lines, which now include the Union Pacific and may purchase the Central Pacific when it comes to be sold under foreclosure. If this be done, it would give the new owners a direct line via Reno, Nev., to southern California and Los Angeles, independent of the Southern Pacific. The contract for the 110 miles of extension has been virtually let to Ramish & Marsh, the contractors who built the present line from Kramer.

—The relations of the great powers are changing, and the Pacific is becoming the center of their striving. The powers that adjoin this ocean are destined to be the actors in the next drama of the world and the Pacific the stage thereof. England is the greatest of these powers. This she owes to Canada and to her possessions in the East. Russia is destined to a future greater than England's present. France is making desperate efforts to build up for herself an Asiatic foothold in this company. China's vast population and wide territory make her another factor in the problem. She may be conquered and enslaved for years, but the great vitality, the great individuality, the exclusive cohesiveness of her people, seem to destine her to an ultimately independent national existence. She must eventually emerge from her position of subjection and inferiority and become one of the great nations of the earth. Japan's role will be a smaller one, but the inherent identity of her interests with China's must make them allies against Europe in working out their common destiny. In the hands of these powers lies the future of the Pacific, and the future of the Pacific is the future of the world. Our country cannot shut its eyes to this condition. The people of America, with a rapidly increasing population producing more than they can consume, with an aggressive character which brooks no opposition, with a coast line greater than that of any power of Europe, dotted with flourishing cities, constitute a factor in the future of the Orient that no apathy, no neglect, can belittle. Whatever policy we may have inherited as to entanglements with European powers must be discarded here. The people of the United States must not be content to see their neighbors to the west, with their boundless potentialities of trade, handed over, an uncontested prize, to the ambitions of Europe. America may attempt to evade the responsibility thrust upon her. She may, with shortsighted resolution, turn her face away from her great future, but she will not succeed. The markets of the Orient are the heritage of her merchants, and the time will inevitably come when the voice of the Republic will be heard in Oriental courts with the same accent of authority as in the commonwealths of South America. It will be well if the certainty of this destiny could be recognized before European statesmanship has barred the way with "vested interests."

Personal.

W. B. DEVEREAUX of Colorado is in Salt Lake City.

JOHN CUPPS is the new Supt. Wheeler mine at Plymouth, Cal.

P. KERWIN of Virginia City, Nev., is in Grass Valley, Cal.

T. A. W. SHOCK is the new Supt. Portland, Or., Gen. Electric Co.

JAS. D. HAGUE has returned to San Francisco from New York City.

A. M. DOBBIE of North Bloomfield, Cal., has returned from Hillsboro, N. M.

MR. LOUIS JANIN has returned to San Francisco from Santa Barbara, Cal.

GEO. P. THURSTON is the new Secy of the Orleans M. Co., of Grass Valley, Cal.

GEO. W. TUTTLE, Supt. Rock Creek M. Co., Grass Valley, Cal., is in San Francisco.

W. H. HUTCHINSON is the new resident Mgr. Am. M. & D. Co., Gibbonsville, Idaho.

T. L. MITCHELL has succeeded L. L. Patrick as Supt. Montezuma mine, Kaslo, B. C.

HIRAM W. HIXON, author of a work on the metallurgy of lead and copper, is in Salt Lake.

P. C. DUBOIS, Supt. German mine, El Dorado, Cal., has returned to the mine from San Francisco.

JAS. M. PAGE of Twin Bridges is the newly elected president of the Montana Society of Mining Engineers.

JAS. CRONAN, recently Supt. of Hale & Norcross, Nevada, has charge of a large property near Hackberry, Arizona.

S. C. WILMANS, formerly of the Rose Creek M. Co., Sonora, Cal., has taken charge of the Boulder mine, Rescue, Cal.

T. H. JENKS, late with the Saginaw M. Co,, Tucson, is now assayer for the Table Mt. Copper Co., Mammoth, Arizona.

D. H. JACKSON of Placerville, Cal., was in Kern Co., Cal., last week examining properties for a New York company.

STEPHEN D. FIELD, whose many inventions in the electrical field are well known, was a recent visitor to San Francisco.

THOS. J. BARBOUR of the Risdon Iron Works, San Francisco, returned this week from a business sojourn in New York City.

COL. THOMAS EWING is in San Francisco, buying machinery for the Bedouin group of mines, Shirt-tail mountain, Arizona.

MR. JOS. MCGILLIVRAY, who has charge of extensive hydraulic mining work in Cariboo, B. C., is in San Francisco buying supplies.

F. W. WILMANS is Supt. of the Rose Creek, Harriman and Old Bonanza mines in Tuolumne Co., with headquarters at Sonora, Cal.

PROF. WALDEMAR LINDGREN, who has been engaged to deliver a course of lectures on practical mining at Stanford University, is at Palo Alto, Cal.

WM. FOSTER, known in California in connection with the Merced Gold M. Co., is now Gen. Mgr. American Mining & Development Co., Butte, Mont.

W. A. BURKHOLDER, who has resigned as Supt. Portland Gen. Electric Co., will, it is locally reported, settle in San Francisco, though remaining in the directory.

MRS. ELLEN PALMER, who is making a success of managing a mine at Hotchkiss mountain, Colo., is the only known woman mine superintendent outside of California.

ISAAC E. BLAKE, Mgr. Utah-Nevada Co. which has bought the copper mines in the Seven Devils region, sixty-five miles northeast of Baker City, Or., has taken charge.

W. C. RALSTON has returned from an extended sojourn on the Atlantic coast. While there he did considerable missionary work in the matter of a department of mines and mining.

U. S. SENATOR TURNER has returned from London and says that his mission was not to sell the Le Roi mine, but to create a market for that mine's stock; that to all inquiries he replied that the price of the mine was $5,000,000.

JOS. SMITH, who, probably as much as any one man, introduced and made profitable the use of cyanide at Mercur, Utah, has been sojourning in San Francisco for some weeks, and returned to Mercur last Monday.

HENRY A. JANVIER and Sydney E. Brown of Bridgeton, N. J., passed through San Francisco this week on their way to a central province of China, where they will build mints for silver and copper for the Chinese Government.

Books Received.

"*Copper*," is the terse title of a 200-page book published by D. Houston & Co., 22 Platt St., New York City, and sent postpaid for $2. It contains considerable new information and valuable statistics, including statements of the operations of several companies, regarding which ordinarily but little is known.

Recent California Mining Incorporations.

Bear Creek G. M. Co., San Francisco; capital stock, $100,000; actually subscribed, $25; J. B. Sherrard, L. Schlessinger, J. Posner, R. E. Ragland, C. J. Murphy.

Kern River Hydraulic Con. P. M. Co., Los Angeles; capital stock, $200,000; subscribed, $190,000; W. H. Barry, J. Hickler, A. Prenzlaner, S. W. Stone, W. G. Campbell.

Bedford G. M. Co., San Francisco; capital stock, $500,000; subscribed, $250; H. W. Morris, J. Buttgenbach, L. Weber, L. Brune, J. P. Wallace.

Princess M. Co., San Francisco; capital stock, $1,500,000; subscribed, $250; W. F. Fickersen, D. S. Sherman, W. A. Turner, E. L. McClure, J. J. Corey.

Golden Crown M. Co., San Jose; capital stock, $300,000; subscribed, $165,500; W. O. Hilbish, E. H. Wimple, A. McDonald, T. A. Perrin, F. P. Russel.

Bear Creek M. & P. Co., Mariposa, Cal.; capital stock, $500,000; subscribed, $625; J. D. Ludwig, W. S. Zeller, T. B. Bisland, J. F. Zimmerman, W. H. Moise.

Recently Declared Mining Dividends.

Mercur, Utah, $25,000; payable Jan. 20.

Silver King, Utah, Jan. 10, $37,500, making a total of $1,387,500.

Mammoth, Utah, $20,000; payable Jan. 20.

Le Roi, B. C., $50,000; Jan. 12. This makes $725,000 paid to date.

Quincy M. Co., Michigan, $3 per share, $300,000, a reduction of $1 from the previous dividend, which was $4 per share, paid Aug. 16, 1897; on Jan. 22, 1897, $8 was paid, $4 being regular and $4 extra. Total dividends declared since organization of the company, $9,770,000.

Morning Star, Iowa Hill, Cal., $6 per share; Jan. 10.

The Santa Maria de La Paz M. Co. at Matehuala announces six dividends for January of $10 each, payable on the 5th, 10th, 15th, 20th, 23d and 30th, under coupons 54 to 59, inclusive.—La Bolsa de Mexico.

Anchoria-Leland M. & M. Co., Colorado, 1 cent per share, $6000; Jan. 15.

Commercial Paragraphs.

THE Colorado Iron Works Co. of Denver, Colo., reports the shipment of four 43-cubic feet capacity self-righting slag trucks to the Detroit Copper Co. of Arizona.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JANUARY 4, 1897.

596,468.—BITUMEN CONVEYOR—A. F. L. Bell, Carpinteria, Cal.
596,648.—FRICTION CLUTCH—G. S. Binckley, S. F.
596,801.—STREAM MOTOR—J. T. Breneman, Walnut Creek, Cal.
596,804.—FEED TROUGH—J. G. Busch, Potter Valley, Cal.
596,805.—WINDOW FLY ESCAPE—A. J. Collar, Yreka, Cal.
596,490.—COUPLING—T. C. Edwards, Salmas, Cal.
596,746.—BOTTLE—W. H. Fulcher, Stockton, Cal.
596,935.—PEACH PITTER—G. E. Grier, Pomona, Cal.
596,678.—BALL BEARING—F. H. Heath, Pomona, Cal.
596,968.—AMALGAMATOR—J. A. Hedge, Los Angeles, Cal.
596,812.—ELECTRIC CONDUIT—W. D. M. Howard, Redwood City, Cal.
596,779.—STEP LADDER—T. M. Jones, Portland, Or.
596,890.—PRUNING TOOL—G. L. Sage, Los Angeles, Cal.
596,606.—FUNNEL—E. D. Middlekauf, S. F.
596,714.—PAPER TOOTHPICKS—M. Purdin, Medford, Or.
596,715.—BRUSH MACHINE—W. C. Read, Oakland, Cal.
596,716.—BRUSH MACHINE—W. C. Read, Oakland, Cal.
596,618.—CHAIN TIGHTENER—F. A. Redmon, S. F.
596,832.—PIPE FOR SMOKING—B. F. Smith, Represa, Cal.
596,645.—WOOD-BENDING MACHINE—Woodward & Brett, National City, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

WAVE AND STREAM MOTOR.—Joseph T. Breneman, M. D., Walnut Creek, Cal. No. 596,801. Dated Jan. 4, 1898. This invention relates to a device for producing power from the movement of the waves or a stream. It consists essentially of swinging suspended gates, the lower ends of which dip beneath the surface of a flowing current, a connection extending from one gate to the other whereby they are so connected in pairs that they will oscillate to and from each other, the floats being journaled vertically so that they may turn to alternately present their flat surfaces to one of the pair of shafts and the edges of the other. This allows the floats which present the flat surface to move in the one direction while the others move freely edgewise of the stream in the other direction. An intermediate mechanism is so arranged as to reverse the position of the floats when they have reached the end of the swing in one direction, and the steam acts to move the other set and return both pairs to the their original position. This oscillation continues and power may be transmitted from the floats to any pulleys or other machanism through which it may be employed.

COMBINED HARVESTER.—Benj. Hale, Stockton. No. 596,446. Dated Dec. 28, 1897. It relates to a novel apparatus for cutting, threshing, separating and cleaning grain in a continuous process by means of a machine which is adapted to travel over the field while carrying on the operation. What are known as "traveling harvesters" have usually been constructed by mounting a threshing machine upon four wheels and hinging to one side of it a large triangular horizontal frame having a reciprocating cutter bar at the front to reap the grain, a horizontal traveling belt or draper behind the cutter upon which the cut grain falls, which draper carries the grain to and delivers it into the feed house, from which it passes to the threshing cylinder and thence through the usual cleaning mechanism. The difficulty with this class of machines lies in the fact that, as the threshing machine portion is supported upon four wheels, it must, unless some provision is made for leveling it, necessarily tilt from side to side as the machine passes over irregular and uneven ground, and this throws the grain to one side or the other of the cleaning mechanism and makes the separation and cleaning very irregular and imperfect. In this new construction the threshing machine has a single large bearing and driving wheel journaled nearly centrally inside the frame and a steering wheel approximately in line with it at the front, so that the threshing machine is carried upon these two wheels in line with each other. When it is properly connected with the header frame, this connection will prevent it from tipping over. The connection between the two consists of a rack bar or equivalent bracing arm, one end of which is movable, so that the header frame inclines upwardly or downwardly in passing over uneven surfaces. The threshing machine can, by means of this connection, always be maintained nearly or quite vertical. Various mechanisms may be employed to make the connection between the two and to adjust it so as to keep the threshing machine level.

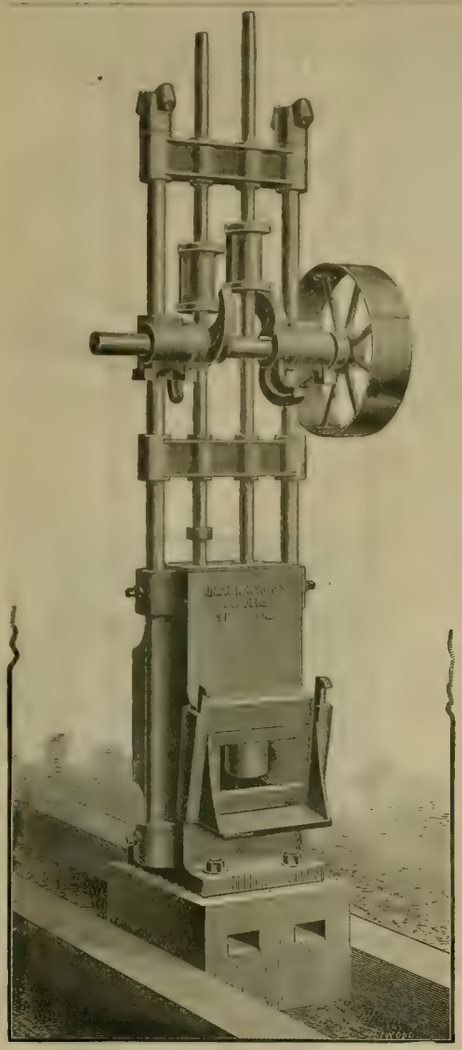
PIPES FOR SMOKING.—B. E. Smith, Represa, Cal. No. 596,832. Dated Jan. 4, 1898. This invention relates to improvements in smokers' pipes. It consists essentially in the combination with the bowl and the stem of a drip cup adjacant to the bowl into which liquid may be deposited, a chamber beyond the drip cup having a reduced neck and a larger neck at the opposite end to connect with the pipe stem. An absorbent material is placed within the chamber between the reduced neck and the inner end of the pipe stem and saturated with a vegetable oil which serves to connect the nicotine and disagreeable vapors which remain essentially substantially on the exterior of the absorbent material and will eventually pass back into the drip cup.

PROTECTING BARN AND FEED HOUSE.—John G. Busch, Potter Valley, Cal. No. 596,804. Dated Jan. 4, 1898. This invention relates to a barn or structure which is especially designed for the economical feeding of stock, and the protection particularly of young lambs, kids and other tender animals. It consists of a structure having closed roof and sides, a floor elevated above the surface of the ground to provide a space beneath into which the animals may be collected, while the space above serves to contain hay and other feed. Along the sides of the lower part are racks and troughs arranged to suit the class of animals which are to be fed, and means for depositing the feed therein either from the barn above or from the outside. Exterior to these feeding troughs and racks are hinged doors which in stormy weather may be closed entirely, but under certain conditions can be raised up so as to allow access to the feed devices from the outside as well as the inside, while the doors thus raised practically form shed roofs to protect the animals which are under them. The ends of the barn are also provided with hinged doors and mechanism by which they can be easily raised or allowed to close so as to keep out the cold at night or in very inclement weather.

WINDOW FLY ESCAPE.—Dr. A. J. Collar, Yreka, Cal. No. 596,805. Dated Jan. 4, 1898. This invention relates to an insect guard or means for reducing the number of house flies and other similar insects which congregate in the rooms. It consists essentially in the combination with the window sash of a means by which an aperture is created between the bottom bar of the sash and the window pane, forming a channel beneath the edge of the bar, and a curved plate coinciding with the channel, with intermediate means for supporting the edge of the glass. This construction is such that the flies following their usual habits will when they reach the lower edge of the glass pass out and up the curvature and thus outside of the glass. The tendency of the flies is to move upward rather than downward, consequently, when they have reached this aperture from the inside they may follow it out, but when they reach it from the outside, the tendency will be to pass on to the glass and up the outside of the glass rather than to go down beneath its edge.

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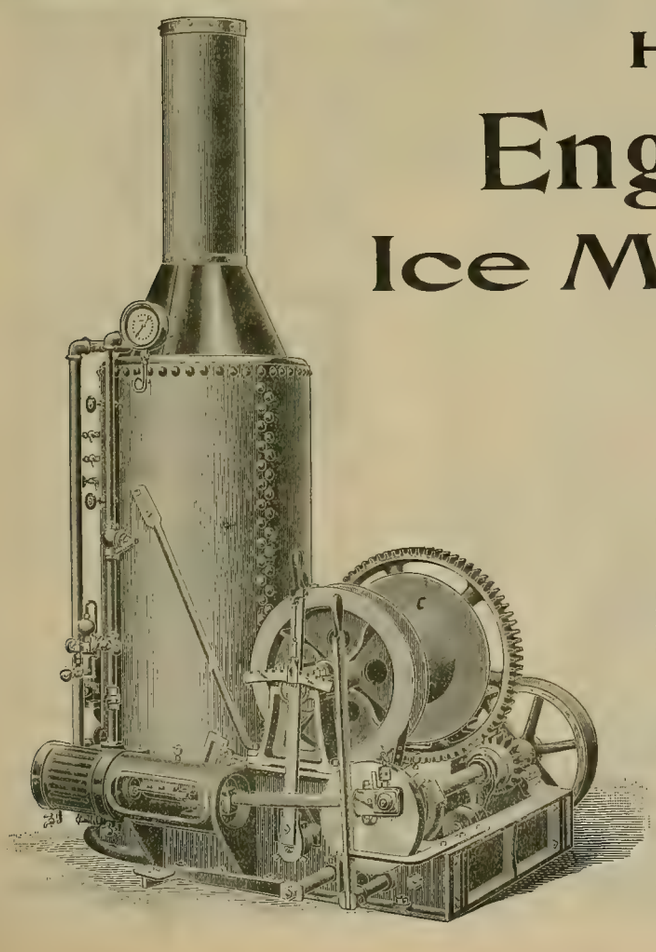
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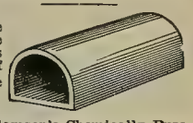
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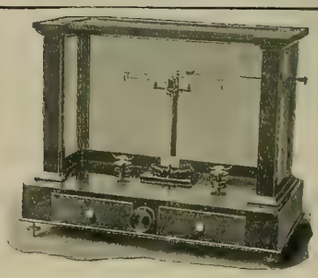


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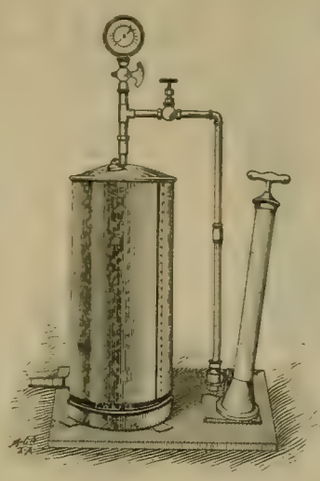
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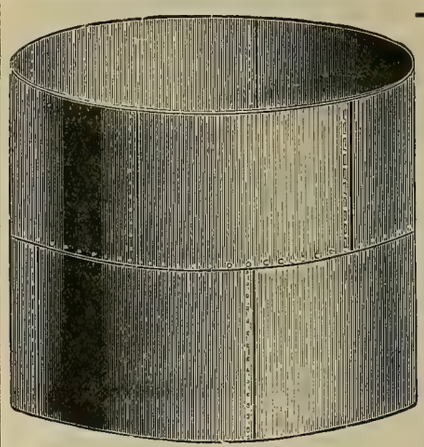
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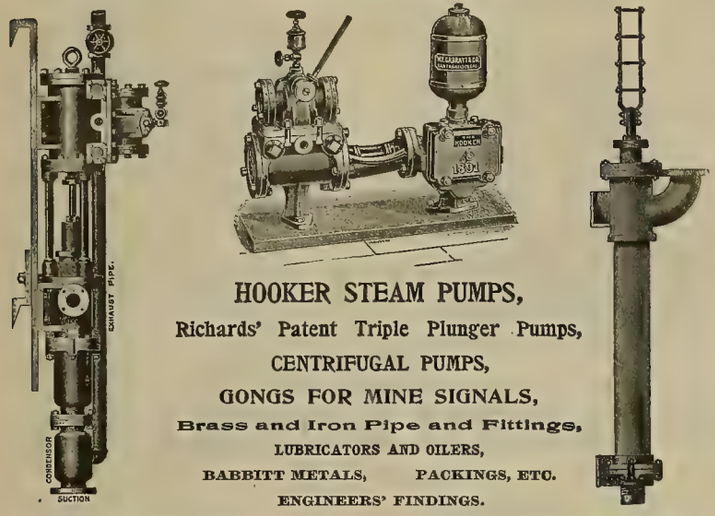
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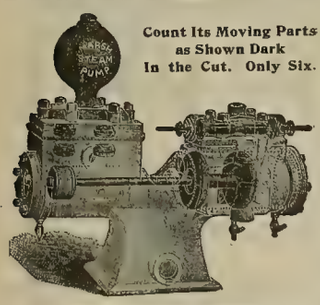
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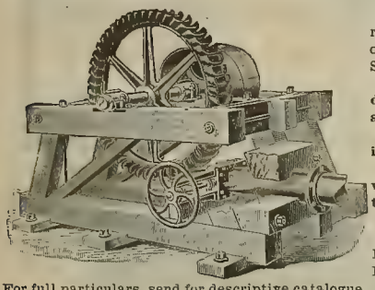
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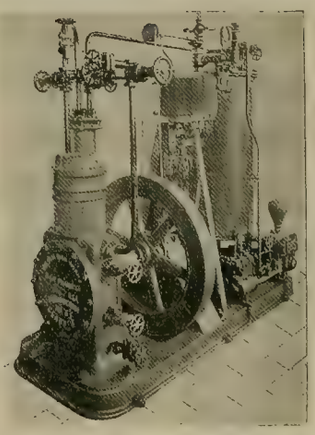
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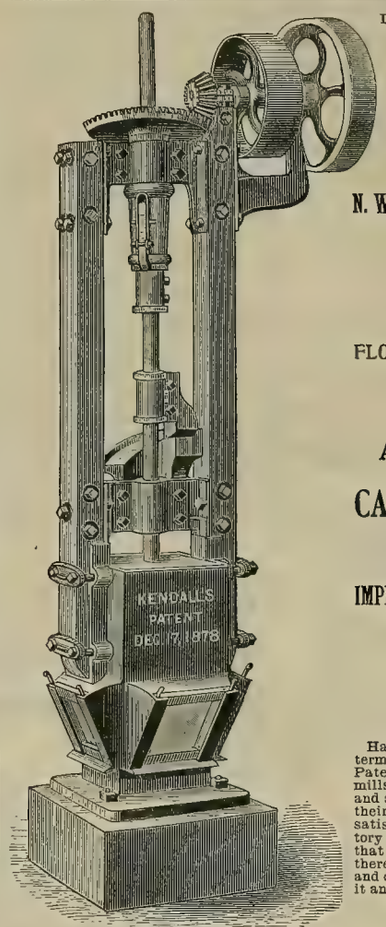
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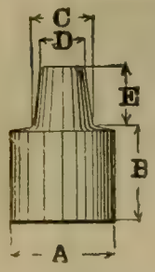
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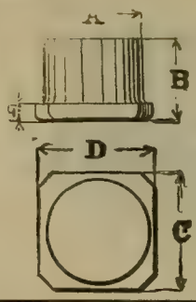
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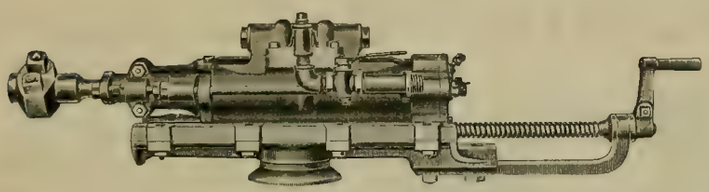
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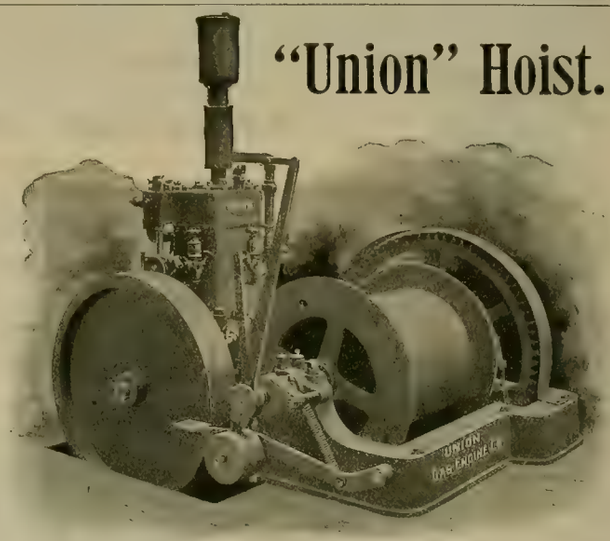
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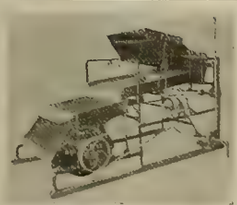
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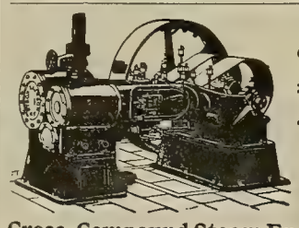
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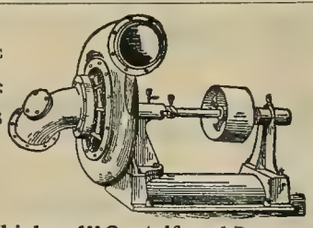
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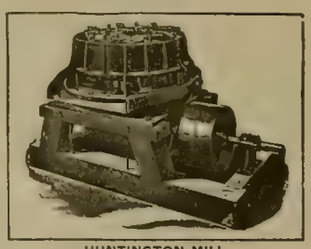
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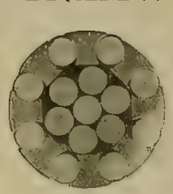
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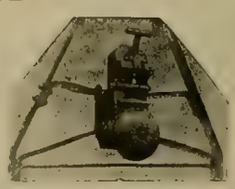


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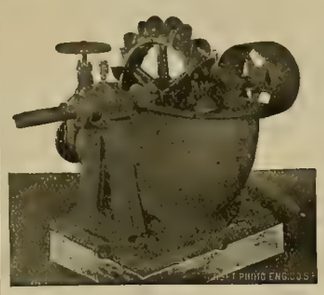


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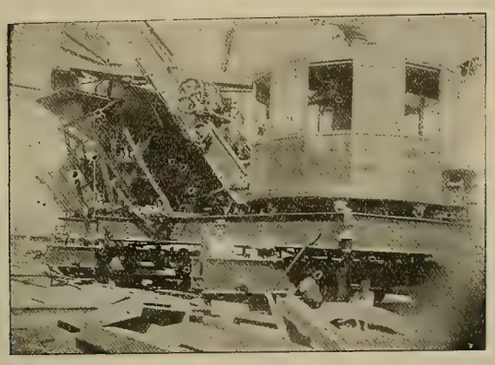
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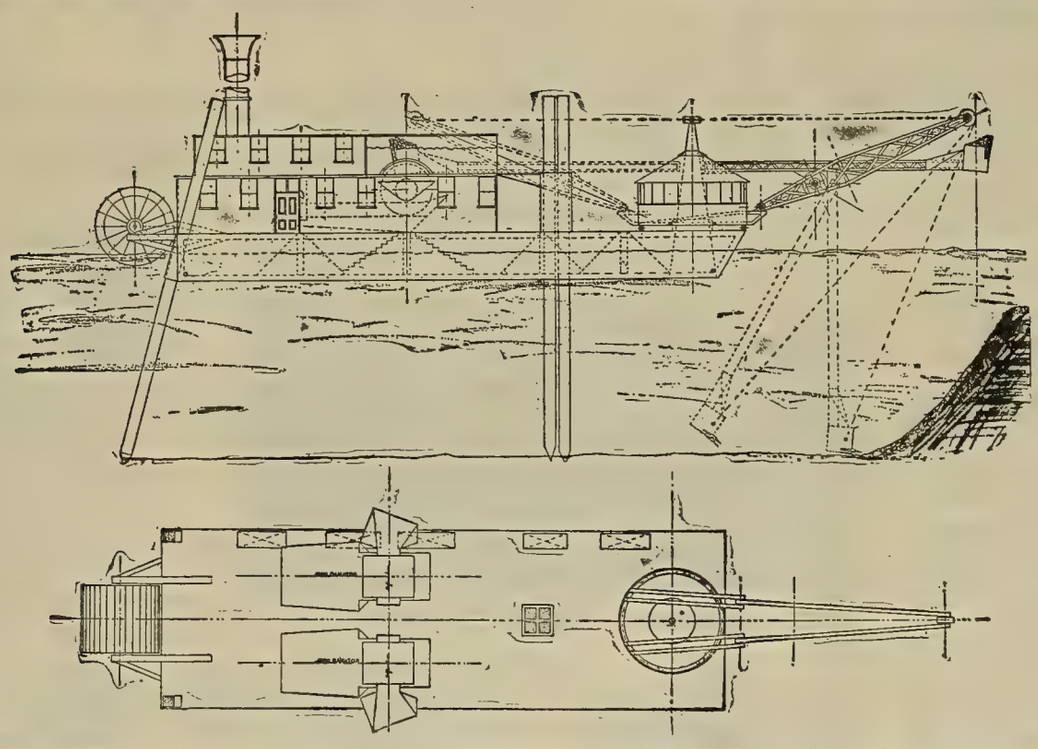
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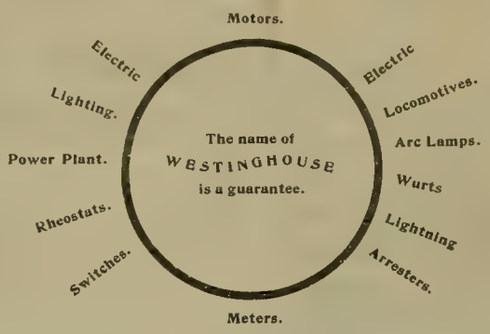
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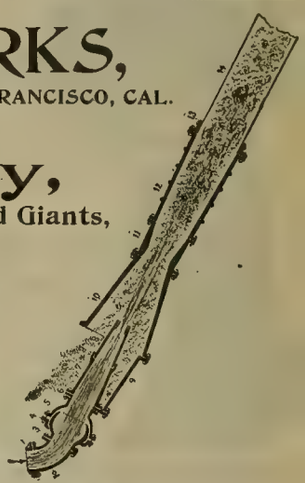


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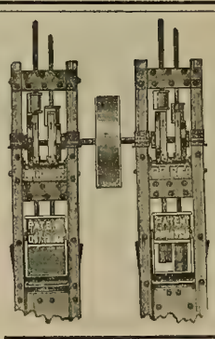
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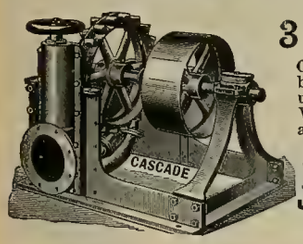
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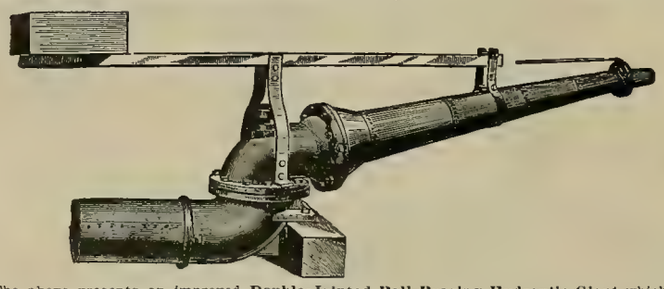
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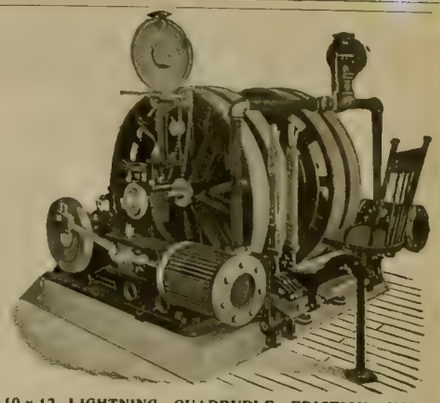
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DENVER, COLORADO, U. S. A.



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Capital paid in..... $2,700,000.

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Cripple Creek, Colo.
Salt Lake City, Utah.
Spokane, Wash.
New York City, N. Y.
Chicago, Ill.
St. Louis, Mo.
In Mexico—
San Luis Potosi,
City of Mexico
Chihuahua.
Pachuca,
Hermosillo,
Jimenez.

FOR PRICES, ADDRESS:
J. E. Jackson, No. 6 Atlas Blk, Salt Lake, Utah.
C. D. Porter, Spokane, Wash.
H. A. True, 815 17th St., Denver, Colo.
J. H. Weddle, Leadville, Colo.
C. E. Finney, Argentine, Kan.

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ENGINEERS AND MANUFACTURERS,

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Market Reports.

The Markets.

SAN FRANCISCO, Jan. 13, 1898.

Trade has been quiet the past week, but everything points to a larger business in all branches of trade and manufacture than ever before enjoyed. Alaska and British Columbia will be large buyers, particularly the former. The different large American transportation lines recognize that San Francisco will be the center for obtaining goods and therefore they will run either direct from here, or else run from here touching at ports up north on the way to Alaska points.

General rains in this State the past week, with prospects favorable for more, have put merchants, manufacturers and all others in a cheerful mood, for they insure, with seasonable spring rains, large crops. The cold weather is quite a factor with fruits, for it puts the season back, which lessens the chance for damage by frosts. Last year several sections were visited by frosts which did considerable damage, particularly to peaches. Good crops and mining boom insure big business.

Regular January disbursements are being made in the local money market, which is going back into the banks for use again. This adds still more to the general cash by increasing the already large supply of idle money. With general rains throughout the State, insuring crops, and a mining boom on, banks are more dispersed to let out funds; but the trouble with them at this writing seems to be a scarcity of good to gilt edge commercial paper, and, so far as can be learned, there will not be much on the market, or at least not the fore part of the year. The money markets at the East are working easier, as they should under heavy disbursements there.

New York Silver Prices.

NEW YORK, Jan. 13. — Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	26 7-16	57
Saturday	26 7-16	57
Monday	26 7-16	57⅛
Tuesday	26⅛	57⅛
Wednesday	26⅛	57⅛
Thursday	26 11-16	57⅛

	Copper.	Lead.	Iron.	Tin.
Fri.	10 90 @11 00	3 70	10 00@12 25	13 77⅛
Sat.	10 90 @11 00	3 70	10 00@12 25	13 80
Mon.	10 90 @11 00	3 70	10 00@12 25	13 80
Tue.	10 90 @11 00	3 72½	10 00@12 25	13 80
Wed.	10 90 @11 00	3 72½	10 00@12 25	13 80
Thur.	10 90 @11 00	3 70	10 00@12 25	13 80

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.82¾
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	57⅛
Mexican Dollars nominal	47@—

SILVER.—The market advanced, but today was lower in New York and higher in London. It is the belief that if China's new loan goes through that country will take considerable silver. The New York *Wall Street Journal* says that the demand for silver seems to come from India and more recently from Japan. The shipments of silver during the last four weeks have been very large, and advices to silver dealers indicate that there is not likely to be much falling off at least for a few weeks to come. There is some surprise that this demand could be so large from India in view of the agitation for the gold standard there. Nevertheless, the silver in use is reported poor. The demand for coinage throughout the whole of Europe is stated to be growing larger. The fact that Japan is losing its gold makes some dealers think that even if India does go on a gold basis it will not lessen the demand for silver. The last steamer hence for China took out in silver bullion for Bombay $25,000, Hongkong $62,300, and Yokohama $28,300.

MEXICAN DOLLARS.—The market has held fairly steady, considering the falling off in the demand. The last steamer hence for China took out for Japan $158,000 worth, for China $138,383.

COPPER.—The East reports a quiet but firm market. Notwithstanding the engineers' strike in England, the consumption of copper in Europe is fully up to last year at this time. The consumption in 1898 is expected to show an increase over 1897.

Our market is quoted as follows:

Ingot casting, jobbing	13 @—
Ingot " wholesale	12¼@—
Sheet copper	— @16½
Bolt ¾ and 5-16, 20c; ⅜ and larger, 16½	

TIN.—The market is quiet for pig. In plate there has been considerable business on spot and to arrive.

The market is quoted in jobbing lots as follows:

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, "	4 00@—

QUICKSILVER.—The market is fairly firm. The shipments to Mexico the past week by sea aggregate 120 flasks.

Our market is quoted at $39 for domestic consumption and $35@36 for export to the west coast of Mexico.

LEAD.—The market is practically unchanged. The East reports quiet but steady markets.

Our market is quoted in jobbing lots as follows per 100 pounds:

Pig	4 75 @ 5 00
Sheet	6 30 @ 6 80
Pipe	5 60 @ 6 10

IRON.—The consumption with us is expected to show a large increase over 1897. Eastern advices report the largest placement for 1898 delivery of pig yet recorded. Notwithstanding this prices are unchanged, owing to the very heavy output—larger than ever.

AMERICAN.	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50
ENGLISH.		
Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

SHOT.—The market is steady.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 40
Drop, B and larger sizes, " "	1 65
Buck, Balls and Chilled, do, " "	1 65

COAL.—The market is firm, with a continued good demand ruling for both house and steam. The exceptionally long spell of cold weather has caused a heavy consumption. Rains the past week will cause more ships with coal to head this way for next season's wheat crop loading. Receipts of coal for the week ending with Tuesday were as follows in tons: Comox, 7460; Nanaimo, 8389; Departure Bay, 4800; Puget sound, 14,813; Newcastle, N. S. W., 3772; total, 39,415.

COKE.—The market is well supplied, bu no lower prices are reported. Imports the past week aggregate 1197 tons from Newcastle, England.

The market is quoted as follows:

Gas Companies'	— — @ — —
English, to load	— @ — —
" spot, in bulk	11 00 @ — —
" in sacks	12 00 @ — —
Cumberland	10 00 @ — —

PLATINUM.—The market is steady.

Our market is quoted in a jobbing way at $15 per ounce and for scrap $10 an ounce.

BORAX.—The market is firm with a good demand ruling.

The market is quoted as follows:

Refined, in carload lots, in barrels	6
Refined, in carload lots in sacks	5¾
Powdered, in car lots	6¼
Concentrated, "	5½

ZINC.—The market is firm.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 45 to 50 cents per pound for ingots.

ANTIMONY.—The market is steady.

POWDER.—The market is firm at current quotations.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9 to 11c, according to strength and quantity.

Chemicals.

There are signs of reviving business, but no marked increase is looked for until February, and until this comes there will probably be no change in quotations. The East reports no changes, with quiet markets for all chemicals except nitrate of soda, which has been in good demand at firm prices, both for spot to arrive and for shipment.

CYANIDE OF POTASSIUM.—The market is steady.

Our market is quoted for chemical pure 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The demand is quiet.

We quote in a jobbing way at 1¼c per lb for 66%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported firm from store at 6¼@7c per pound in carboys.

BONEASH.—There is a slow demand.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady.

We quote in a jobbing way at 4c per pound.

SPELTER.—The market is steady.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is firmer.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steadier at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA. — The market is quiet, with a firmer tone.

Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

Mining Share Market.

SAN FRANCISCO, Jan. 13, 1898.

The market held up last Friday, but Monday there was an easier tone in the morning, with light business both on and off call, which was followed by freer offerings by chippers, that resulted in lower prices. Tuesday the market shaded off still more, which caused lower prices Wednesday morning, but at the 2:30 session a steadier tone set in with Sierra Nevada stiffening. During the shading off, Occidental not only held up but moved up slightly, closing firm, with the tendency upwards, owing to confirmed reports that the mine is looking better. A strike of ore is looked for within the next fortnight or two. On the Comstock the situation in several of the mines is far from discouraging; this is particularly the case in Sierra Nevada, Justice and two in Gold Hill. They ought to strike ore in both Sierra Nevada and Justice in February, but, to discourage buying by outsiders, Sierra Nevada may be assessed, as may several others. This opinion is based on experience, that when the market is down and a pool is preparing for a deal, they do everything imaginable to get holders to sell and keep other outsiders from buying. The work in Con. Virginia is reported quite favorable, but talk of assessment is against the shares. There is one thing morally certain, and that is mill owners will have ore in the different groups uncovered before spring passes, so as to keep the mills running, but it is equally as certain that outsiders will not get any of the proceeds from the bullion, for this is one of the perquisites in consideration of uncovering the ore so as to promote better prices for shares. Yet if the public do not buy on the advance, but sell, then the manipulators may be compelled to put prices to higher figures than contemplated. The very large disbursements in this city this month, with trade and crop prospects good, will be instrumental in promoting better prices for shares, particularly with active exploiting of the mines under way.

The news from the Comstock mines officially is not materially changed from last week's advices, but reliable private information is more cheerful and speaks hopefully of two or more ore strikes in the near future, but as to the extent of the ore no opinion is ventured. A south drift has been started in Utah from the end of the northwesterly crossdrift. At last advices it was in favorable formation. Necessary repairs are said to be completed in Sierra Nevada, and work resumed at different points. The downward continuation of the ore found above is expected to be struck within three or four weeks. In Union the work that is being done is unimportant; it seems to be of a kill-time character. They are still going east in Mexican. It looks as if they ought to be through blocking out and killing time, and, incidentally, financially killing off outside holders, and commence work to run for the ore reported to exist in the mine. They are still going west in Ophir on both the central tunnel and 1000-foot levels. In doing this they follow Horace Greeley's advice to go west. The formation in both west crossdrifts is favorable, although the vein matter assays only 50 cents a ton. In Con. Virginia active exploiting is continued on the 1550-foot, 1650-foot and 1750-foot levels with favorable indications, particularly on the latter level, where some bunches of good ore are being found. Work in Best & Belcher and Gould & Curry will be resumed as soon as repairs to the Bonner shaft are completed. The shifting of ground on the Comstock necessitates almost continuous repairing in all the mines, and is a source of large expense, which accounts for the expenditure of much of the money. In Savage the work is practically the same as reported last week. It is in the right direction. No work in Hale & Norcross. The joint repairs by Chollar and Potosi indicate that the foundation is being laid for extensive exploiting work in both mines the coming spring and summer. Repairs are being made to the main incline so as to put it in good order as far down as the 1600-foot level. They are still running a joint Potosi-Bullion drift south. East crossdrift No. 1, above the tunnel level in Potosi, is in 20 feet. The vein matter is low grade. The Crœsus shaft in Bullion is being repaired and retimbered. They are down over 110 feet. After this is through with and work resumed, it will be watched with interest by mining men. They will be ready soon to commence active exploiting work in Alpha. At present they are engaged in repair work. In Con. Imperial the work is the same as heretofore reported. It looks as if the long west crossdrift will drain all of Mount Davidson above that level. The water to the west has been a serious difficulty, but it has been tapped now at the more important points, so that west workings will not be interfered with from this source. Nothing new comes to hand from Confidence or Challenge. There are favorable reports from Yellow Jacket, but a pending assessment makes operators shy of the shares. Active exploiting work is reported in Belcher and Crown Point. There are those who are quite confident that a body of ore will be struck in one of them before spring passes. Justice is proving to be strongly mineralized. They expect to strike the ore they are running for in about two or three weeks. Nothing new from Alta.

News from the Brunswick lodes report active work being done towards the west. The different managements seem to be inspired by more confidence in good results since the expert's report on that lode. The joint work by Con. Virginia, Best & Belcher and Gould & Curry is being carried on on the 600-foot level. Two west crossdrifts and one east crossdrift are being run. The formation to the west is now favorable. In Chollar they are running two west crossdrifts, one on the 200-foot level and the other on the 500-foot level. On the 600-foot level they are running an east crossdrift. In Potosi they are running a joint west crossdrift on the 500-foot level. In Occidental they are running a west crossdrift on the 350-foot level. They are running an east crossdrift on the 650-foot level and running south on the 750-foot level along the east side of the ore body.

The following illustrates the changes of the week:

Mines.	Jan. 6.	Jan. 13.
Alpha	.....	.....
Alta Consolidated	$ 12	.....
Andes	15	.....
Belcher	43	$ 38
Best & Belcher	50	50
Bodie	.....	.....
Bullion	.....	.....
Challenge	24	21
Chollar	.....	26
Confidence	.....	80
Consolidated California and Virginia	1 25	1 20
Consolidated New York	.....	.....
Crown Point	25	27
Exchequer	.....	.....
Gould & Curry	38	.....
Hale & Norcross	.....	.....
Justice	.....	31
Mexican	.....	25
Ophir	60	.....
Overman	.....	.....
Potosi	32	30
Savage	18	17
Sierra Nevada	.....	60
Union	35	38
Utah	09	.....
Yellow Jacket	35	35

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delin'q't and Sale.	Secretary.
Alta S M Co, Nev	58	10c	Dec 3	Jan 7..Jan 28	J E Jacobus, 309 Montgomery
Bullion M Co, Nev	51	5c	Dec 17	Jan 21..Feb 12	R R Grayson, 331 Pine
Challenge Con M Co, Nev	24	10c	Dec 16	Jan 19..Feb 9	C L McCoy, Mills Building
Chollar M Co, Nev	45	20c	Jan 8	Feb 11..Mar 8	C E Elliot, 309 Montgomery
Hale & Norcross S M Co, Nev	11	10c	Mar 20	Dec 28..Jan 18	R R Grayson, 331 Pine
Marguerite G M & M Co, Cal	8	10c	Nov 4	Dec 13..Jan 15	F Mettmann, 237 Twelfth
Marina Marsicano G M Co, Cal	12	9c	Jan 3	Feb 7..Feb 28	Chas Bovone, 217 Sacramento
Mexican G & S M Co, Nev	58	15c	Jan 6	Feb 10..Mar 3	Chas E Elliot, 309 Montgomery
Occidental Con M Co, Nev	29	10c	Dec 7	Jan 11..Feb 1	A K Durbrow, 309 Montgomery
Red Cap M Co, Cal	2	$5	Nov 29	Jan 6..Jan 29	H H Martin, 125 Beale
Savage M Co, Nev	94	20c	Jan 6	Feb 8..Feb 28	E B Holmes, 309 Montgomery
Union Con S M Co, Nev	55	15c	Dec 6	Jan 11..Jan 31	A P Swain, 309 Montgomery
Utah Con S M Co, Nev	26	5c	Dec 2	Jan 6..Jan 24	A W Havens, 309 Montgomery

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 13, 1897.

9:30 A. M. SESSION.

300 Belcher	38	50 Mexican	25
400 Best & Belcher	50	400 Occidental	1 40
100 Challenge	21	100 Sierra Nevada	60
100 Chollar	26	800 Union	38
450 Con Cal & Va	1 20	500 Yellow Jacket	35
100 Crown Point	27		

SECOND SESSION—2:30 P. M.

200 Belcher	33	100 Best & Belcher	45
150 Confidence	80	100 Savage	17
1100 Justice	31	300 Chollar	25
200 Union	36	500 Potosi	30
300 Occidental	1 45	50 Crown Point	25

WILL NEGOTIATE with owners or their duly authorized agents only.

WILL INVESTIGATE only thoroughly bonafide properties, either Mines, Prospects or Mineral Lands, whose owners are willing to make reasonable terms. When sending reports on properties also send terms on which you are willing to sell or lease.

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Marquette, Mich., U. S. A.
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Skeleton Mining Report.

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Assessment Notices.

MARINA MARSICANO GOLD MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 3rd day of January, 1898, an assessment (No. 12) of 9 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1898, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

THE SAVAGE MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 6th day of January, 1898, an assessment (No. 34) of 20 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Humboldt County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 29th day of November, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name	No. Cert.	No. Shares.	Amt.
Harvey M. Binckley	2	1	5 00
Alice E Binckley	20	4	20 00
Alice E. Binckley	23	20	100 00
Alice E. Binckley	24	20	100 00
Alice E. Binckley	25	20	100 00
Alice E. Binckley	26	20	100 00
Alice E Binckley	39	1	5 00
Alice E. Binckley	40	2	10 00
Caroline S. Townsend	18	20	100 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the corporation, 125 Beale street, San Francisco, California, on SATURDAY, the 29th day of January, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from B. Freccero, in the Frazer and Swank Gravel mine at Washington Ranch, Calaveras Co., to deposit tailings in an old pit; from Manuel Silva and Joseph Enos, in the Cherokee Flat mine at Cherokee, Butte Co., to deposit tailings on a flat below the mine; from J. Lagomasino, in the Grizzly Bear Placer mine near Johnsville, Plumas Co., to deposit tailings in Squirrel creek; from Paul Zerga et als., in the Last Chance Placer mine near Sierra City, Sierra Co., to deposit tailings on a flat below the mine; from T. T. Kirkham, in the Mt. Vernon mine near Nevada City, Nevada Co., to deposit tailings in Mt. Vernon ravine; from William Ross, in the Clark mine near Oleta, Amador Co., to deposit tailings in Deadman's creek; from Chas. E. Wise, in the White Oak mine near Colfax, Placer Co., to deposit tailings in Live Oak ravine; from John Solari and Joe Devencenzi, in the Red Gulch and Mahala Flat Hill mines near Volcano, Amador Co., to deposit tailings in a ravine below the mines; from J. F. and M. H. Goodman, in the Bicknell mine near Volcano, Amador Co., to deposit tailings in the North Branch of Sutter creek; and from S. R. Hackley, in the Indiana and Gold Bug mine near Omo Ranch, El Dorado Co., to deposit tailings in Perry's creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 17, 1898, at 1:30 p. m.

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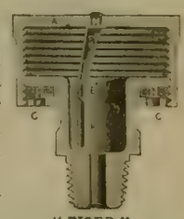


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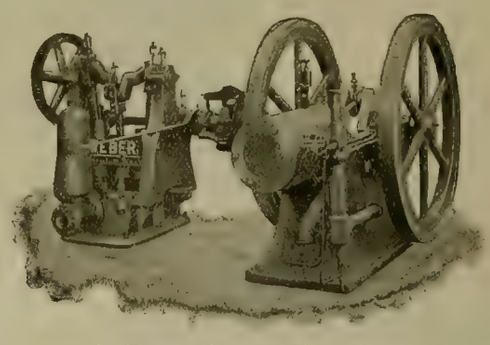
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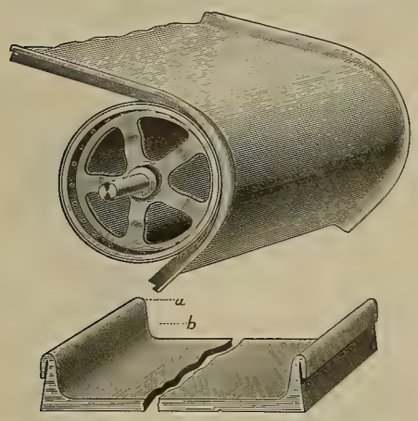
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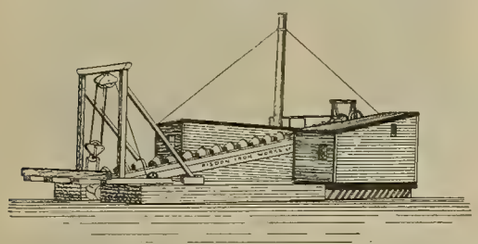
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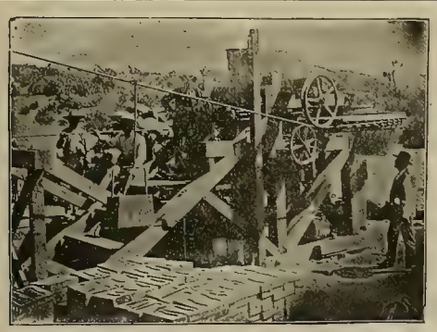
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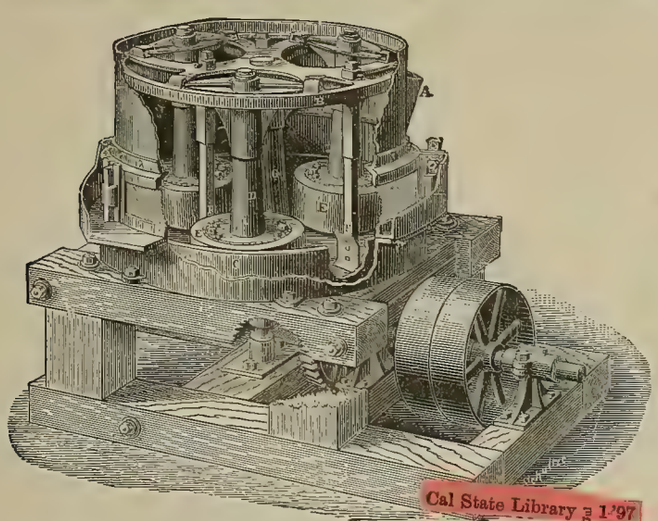
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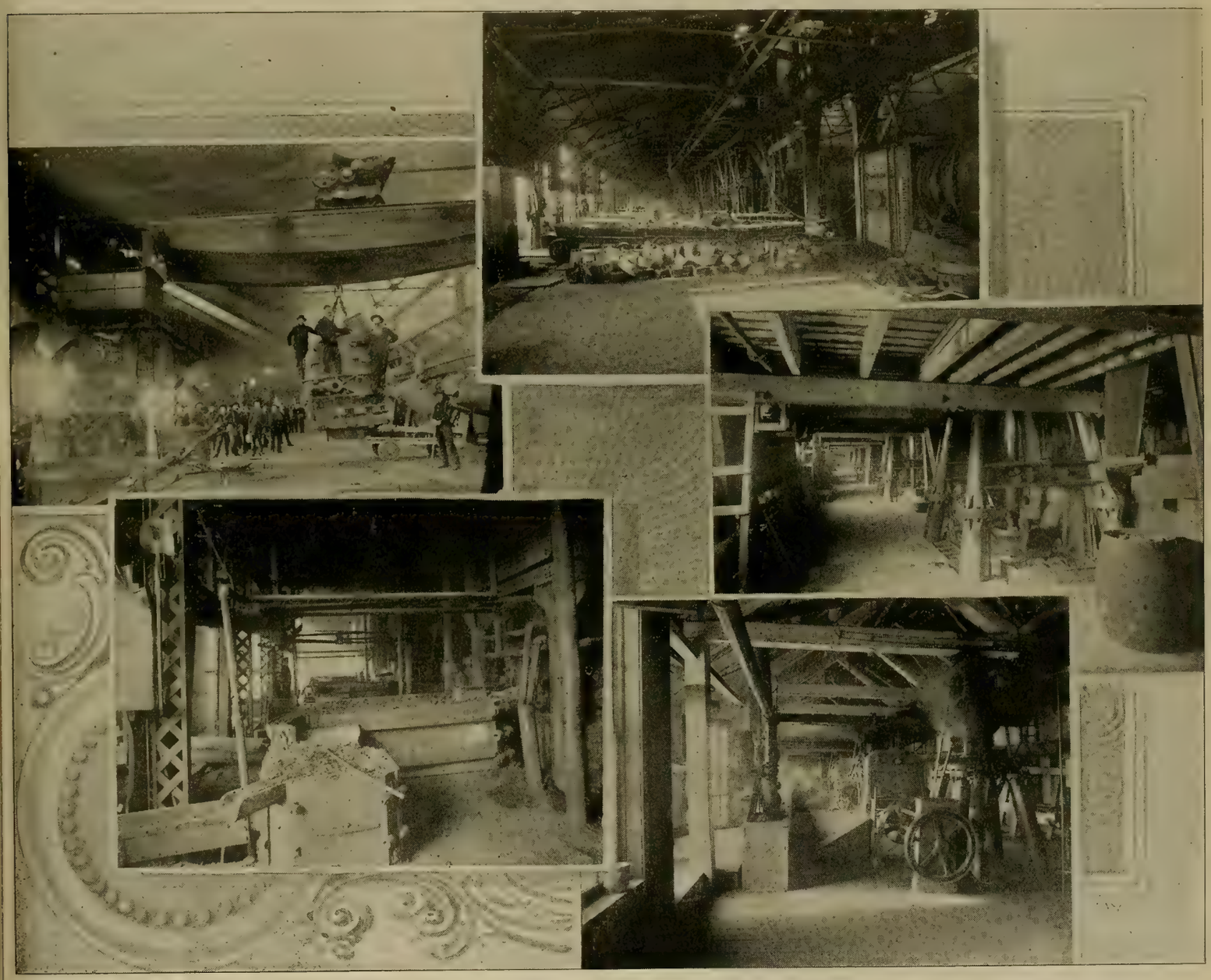
No. 1959.—VOLUME LXXVI. Number 4. SAN FRANCISCO, SATURDAY, JANUARY 22, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Smelting Plant at Anaconda, Montana.

Herewith is presented, through the courtesy of the Butte *Miner*, some interior scenes of the smelting plant at Anaconda, Montana. In a region noted for big producers, the Anaconda is prominent because of the great magnitude of its operations. From July 1, 1896, to July 1, 1897, the average daily output of the Anaconda group of mines was 3600 tons. The group comprises the Anaconda, St. Lawrence No. 1, St. Lawrence No. 2, High Ore, Green Mountain, Buffalo, Mountain Consolidated, Wake-up-Jim, Bell, Diamond, High Ore No. 2 and Never Sweat. The High Ore and Green Mountain are each 1700 feet deep; the others vary from 1200 to 1600 feet in depth.

The product of these mines is treated in the company's smelters at Anaconda, twenty-seven miles from Butte, and is transported to the works by the train load. The largest locomotive ever built lets the loaded cars down on the hill line from the mines to Rocker, and other locomotives there haul them to Anaconda. The smelting plant is complete in every detail, and furnishes employment to about 2000 men. The company's mines at Butte provide work for between 1500 and 1600 men. During the year the company has paid over $3,000,000 in dividends, and is about to pay another of nearly a million more. Although some of the Anaconda mines are being worked to a fairly good depth, the ore seems to grow richer and the veins wider as they go down. It is understood that the vein of the Never Sweat at the 1200-foot level is nearly all copper glance. The ore of all the Anaconda properties carries a large percentage of both gold and silver—more of the latter than the former, silver at the Anaconda being a "by product."

The great event of '97 in Butte was the pushing deeper of the shafts through which are now hoisted over 5000 tons of ore daily. It had long been prophesied that no mine in that district would pay below the 1000-foot level. There are now twenty mines in Silver Bow county being worked at a greater depth than 1000 feet. Of forty copper-silver mines in and about Butte three are being worked at a depth of 1400 feet, six at 1500, two at 1700, four at 1000, three at 1200 and one at 1600.



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J. F. HALLORAN.....General Manager

San Francisco, January 22, 1898.

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IT would be good business in every way to have the mineral exhibit at the Golden Jubilee Mining Fair in this city transferred intact to the Trans-Mississippi Exposition at Omaha. No better advertisement could be secured, and California owes it to herself and to the mining industry to be properly represented with her sister States at that great gathering.

GOV. BUDD has issued the following proclamation: "It is contemplated that the fiftieth anniversary of the discovery of gold in California be celebrated on the 24th day of January, A. D. 1898. Recognizing the significance of that event, and the influence which that discovery has exercised upon the destinies of California and the history of the world, and having been thereunto requested, I, James H. Budd, Governor of California, do hereby proclaim and appoint Monday, January 24th, A. D. 1898, a legal holiday."

THE NATION, the State and the city combine to celebrate next Monday, the 24th inst., which has been selected as the day on which to begin the commemoration of the fiftieth anniversary of the discovery of gold by Marshall in this State. The details have all been arranged, and, if the weather be fine, the parade will be the largest ever seen in San Francisco. From every fort in the harbor will be fired the national salute. On one of the handsomest thoroughfares in America will march several thousand men, representing every social, civic and military organization in the State. The extent of the parade can be judged from the simple statement that, while it is to move promptly at 10:30 A. M., it is thought that the last division will not disband until 4:30 P. M. In the line will appear the largest number of United States troops ever seen on parade at one time in San Francisco, there being eight companies of infantry, eight of artillery and four troops of cavalry. The mining associations, the Pioneers, the Native Sons, and social organizations to the number of many thousands; floats, banners and music, will combine to form a most attractive display. This will be but the beginning of a week of festivities of various natures in commemoration of the great event. On the 29th begins the Golden Jubilee Mining Fair at Mechanics' Pavilion in this city, which will continue until March 6th, and which deserves to be visited by every one directly or indirectly connected with mining interests. Whether experienced or not, every miner will find much in that great building of value to him. It is the intention to have it an epitome of mining from the earliest '49 methods to the latest improved processes of the day. More especially to anyone contemplating a trip to the Yukon region, the exposition will be a school of instruction. The continued, united and earnest efforts of those well qualified to handle such an enterprise justifies the assertion that the entire project will be a success.

Need for a Secretary of Mines and Mining.

House Resolution 5861 was introduced in the House of Representatives, January 6, 1898, by Congressman Barham of California, and referred to the Committee on Mines and Mining.

A Bill to Create an Executive Department of Mines and Mining:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that there shall be at the seat of government an executive department to be known as the "Department of Mines and Mining," the general design and duties of which shall be to acquire, by examination, practical and scientific experiments, geological research, or otherwise, useful information on subjects connected with mining in the general and comprehensive sense of the word, and to diffuse same among the people of the United States.

SEC. 2. That said department shall be under the supervision of a Secretary of Mines and Mining, who shall be appointed by the President, by and with the consent of the Senate; and section one hundred and fifty-eight of the Revised Statutes is hereby amended to include such department, and the provisions of title four of said Revised Statutes, including all amendments thereto, are hereby made applicable to said department.

SEC. 3. That there shall be in said department an Assistant Secretary of Mines and Mining, to be appointed by the President, by and with the advice and consent of the Senate, who shall perform such duties as may be required by law or prescribed by the Secretary thereof.

SEC. 4. That the Secretary of Mines and Mining shall receive the same salary as is paid to the Secretary of each of the executive departments, and the salary of the Assistant Secretary of Mines and Mining shall be the same as that now paid to the First Assistant Secretary of the Department of the Interior.

SEC. 5. That the duties now imposed by all laws and parts of laws relating to mines and mining affairs exclusively upon any existing department of the Government, or any division or bureau thereof, shall, on and after the day this act takes effect, be performed by the Department of Mines and Mining.

SEC. 6. That the Geological Survey is hereby transferred to the Department of Mines and Mining.

SEC. 7. That the sale of the mineral lands of the United States shall be conducted under the auspices of the Department of Mines and Mining.

SEC. 8. That on the organization of this department all officers and employes wholly engaged in official work in any department of the Government, or any division or bureau thereof, engaged in the performance of the duties referred to in section five of this act, and all such employed in the departments referred to in sections six and seven hereof, shall be transferred to the Department of Mines and Mining.

SEC. 9. That all records, maps, documents, instruments, surveys, machinery, and other materials now in the possession and use of any existing department of the Government, or any division or bureau thereof referred to in sections five, six, and seven of this act, are transferred to the Department of Mines and Mining.

SEC. 10. That this act shall go into effect on the fourth day of March, eighteen hundred and ninety-nine.

There is immediate and pressing necessity for the creation of a new department in the Cabinet—a Secretary of Mines and Mining. The idea is not a new one; the need of its existence has long been recognized, and at times has been urged upon the attention of the public and our national legislators.

Upon the prosperity of the mineral industry primarily rests the prosperity of any country; anything that tends to foster and encourage this industry is within the province and should be a part of the purpose of a well-regulated government, of whatever form it may be. The value and extent of the mining industries of this nation are of sufficient importance to justify the creation of a position in the Cabinet, to be filled by a Secretary of equal rights and privileges with the other Secretaries.

The total value of the mineral production in 1894 was $581,211,258; for 1895 it aggregated $678,001,934; for 1896 it totalized $742,770,878; for 1897, $762,061,106. These few figures graphically illustrate the importance of the industry which is at present totally unrepresented in the Cabinet of the nation. It is only by the creation of a Department of Mines and Mining and the appointment of a Secretary that the mineral industry of this nation can be appropriately represented. The creation of the Cabinet of the President of the United States has been a matter of evolution. In the infancy of this country the Cabinet consisted of three members—Secretary of State, of War and of Navy. We now have in addition, Secretary of Interior, Attorney-General, Postmaster-General and Secretary of Agriculture; we should have a Secretary of Mines and Mining. If the agricultural interests of this country justify a Secretary, the mining industry of the country is equally entitled to such representation.

Anyone who has had anything to do with mining legislation, or with the vast and varied interests directly and indirectly connected with mining in this country, realizes how inadequately represented this great industry is. As at present constituted, the only Cabinet connection that this Government has with its great basic industry is a subordinate official in the land department, the land department occupying a subordinate position in the office of the Secretary of the Interior.

Every one knows the lamentable result of such inadequate representation; the rulings adverse to the miners by men who are not to be blamed for not knowing anything about the points upon which they are ruling; contradictory decisions; the constructions of law in one part of the department that were construed precisely opposite in another office; the constant clash of superiors and inferiors, and the evident embarrassment which such style of work entails upon the office in which it originates—are all matters of public regret. In this regard the action of our country is in painful contrast to that of other countries, which, while less progressive in the main, in this instance certainly evince better understanding of existing requirements. We are behind other civilized nations. On the continent of Europe are Government departments of mines and mining under men whose sole duty it is to attend to that great industry, to foster and protect it; and the result of such governmental provision is effective and satisfactory to the citizens of those countries and beneficial to the nations fortunate enough to have such departments of mines and mining.

It is not a question of expense, but of economy. No more economical action could be devised than the creation of the department suggested. It is the duty of the Government to see that the great sources of national wealth are not wasted. Millions upon millions have been irretrievably lost by reason of the neglect that has resulted from the lack of such representation as that urged. The cost would be trivial, and purely as a business proposition there is nothing before the American people sounder in policy or more appropriate from an economic point of view than the creation of this department. It is not a local question; it affects the entire nation; it is as broad in its requirements as the geographical limits of our whole country. There is a general realization throughout the United States of the justice of this proposed measure. Everywhere it is mentioned spring up friends and earnest advocates, for every one realizes how necessary it is that the industry which lies at the base and upholds the other industries of the nation should have appropriate representation in that nation's cabinet.

A MATTER of some interest to California miners terminated last week. The Government had brought suit against the Central Pacific railroad and sundry Butte county residents to secure a reversion of a section of mineral land in that county. In 1866 the public land commissioner granted the land to the railroad company as agricultural land. The company subsequently sold it to the Butte county men, who were made general defendants in the suit, and who developed large mining interests thereon. The Government, through its lawyers, asked that the patent be cancelled by reason of error on the part of the land commissioner, as the land was evidently mineral and not subject to the terms of the original grant. It was further held that the defendents were acquainted with this fact and that they also owned mines in the immediate vicinity of the lands under dispute. The counsel for the Government maintained that this error of the land commissioner could be corrected and that the original patent to the railroad company could be cancelled, which was the view held by Judge Morrow in deciding the case.

DURING the week sufficient rain has fallen in the foothills of the State to practically overcome the serious drought and cold of the preceding two months, which almost entirely cut off water supply and caused the cessation of considerable mining.

Answers to Correspondents.

A mining claim is open to relocation. The only work done on it for the year 1897 was the surveying of said claim preparatory to applying for a patent. Will the surveying hold said claim as assessment work done? The patent has not been granted. Notice of publication has not as yet appeared in county papers. M. S.
White Hills, Arizona.

Neither surface nor underground surveying will count as development work.

J. F. C., Groveland, Cal.: The deepest shaft in the United States is the Red Jacket, Calumet & Hecla, Lake Superior, a little over 4900 feet. The shaft in the Tamarack mine, same district, is 4500 feet deep. The deepest shaft in California is believed to be the Kennedy. Amador Co., 2200 feet, though the Idaho, Nevada Co., and the Sierra Buttes, Plumas Co., are almost the same depth. The deepest shaft in Colorado is the California, 2150 feet; the Geyser, Silver Cliff district, Colo., is almost as deep. The map of the Comstock lode, published on page 55 of last week's issue, graphically answers the remainder of "J. F. C.'s" inquiry.

The annual assessment work required by U. S. law is not performed during 1897 upon claim upon which are buildings and machinery put there for mining purposes. The claim is relocated Jan. 1, 1898. Does the relocator become the owner of the buildings and machinery attached to the surface of the claim, if his title to the claim proper is sustained? H. L. C.
San Diego, Cal.

No; he does not. Failure to comply with any Government requirement affects only the title to the mine itself.

"A" has located a placer claim and has done his assessment work, etc., to comply with all requirements. "B" locates a quartz ledge on said placer claim. Can "B" hold this location, or does a placer location hold all ledges within its boundaries, the location being on unpatented ground? T. R.
Smartsville, Cal.

As stated, "B" can locate and hold the claim. Section 413 of Lindley on Mines lays down the law and cites the authorities: Until an application for a placer patent is filed, any one may locate the lode within the placer, provided there is a *bona fide* discovery of such lode and the location is made peaceably and without force. A placer *patent* carries all lodes not known to exist at the date of the patent application; but a lode discovered within the limits of a placer at any time prior to such application may be located by anybody, and the placer location to this extent must yield to the lode location.

R. W. D., Auburn, Cal.: Under the present California law within sixty days from the date of the discovery of a vein or lode the discoverer must perform $50 worth of labor in developing his discovery, and distinctly mark his location on the ground so that its boundaries can be readily traced, and must file in the office of the county recorder of the county in which the claim is situated a certificate of location, which said certificate shall state the name of the lode or claim; the name of the locator or locators; the date of discovery and posting of the notice provided for in section two of this act, which shall be considered as the date of the location; a description of the claim, defining the exterior boundaries as they are marked upon the ground, and such additional description by reference to some natural objects, or permanent monument, as will identify the claim; a statement that such certificate is the final or competed notice of location, and that he has performed the aforesaid $50 worth of labor in development work thereon within the aforesaid sixty-day period, stating generally the nature thereof. Said certificate shall be dated and signed by or on behalf of the locator or locators, and verified by them or by some one in their behalf, and when filed for record shall be deemed and considered as prima facie evidence of the facts therein recited. A copy of such certificate of location, certified by the county recorder, shall be admitted in evidence in all actions or proceedings with the same effect as the original. The performance of such labor shall be deemed a necessary act in completing such location and a part thereof, and no part thereof shall inure to the benefit of any subsequent location.

The discoverer of placers or other forms of deposit, subject to location and appropriation under mining laws applicable to placers, shall locate his claim in the following manner: First—He must immediately post in a conspicuous place at the point of discovery thereon a notice or certificate of location thereof, containing the name of the claim; the name of the locator or locators; the date of the discovery and posting of the notice hereinbefore provided for, which shall be considered as the date of the location; a description of the claim by reference to legal subdivisions of sections, if the location is made in conformity with the public surveys; otherwise, a description with reference to some natural object or permanent monument as will identify the claim, and where such claim is located by legal subdivisions of the public surveys such locations shall, notwithstanding that fact, be marked by the locator upon the ground, the same as other locations. Second—Within thirty days from the date of such discovery he must record such notice or certificate of location in the office of the county recorder of the county in which such discovery is made, and so distinctly mark his location on the ground that its boundaries can be readily traced. Third—Within sixty days from the date of the discovery the discoverer shall perform labor upon such location or claim in developing the same to an amount which shall be equivalent in the aggregate to at least ten dollars' ($10) worth of such labor for each twenty acres, or fractional part thereof, contained in such location or claim. Fourth—A failure to perform such labor within said time shall cause all rights under such location to be forfeited, and the land covered thereby shall at once be open to location by qualified locators other than the preceding locators, but shall not in any event be open to location by such preceding locators, and any labor peformed by them thereon shall not inure to the benefit of any subsequent locator thereof. Fifth—Such locator shall, upon the performance of such labor, file with the recorder of the county an affidavit showing such performance, and generally the nature and kind of work so done.

J. B., Los Angeles, Cal.: J. B. Reinstein, 217 Sansome St., San Francisco, will furnish upon application full particulars of the international competition for plans for buildings, etc., for the University of California. The sum of $20,000 is available for such plans.

W. A., Stateline, Nevada: A good way to free copper plates from gold is to put them over a charcoal fire and slowly evaporate the quicksilver. The plates should be cooled gradually, then rubbed with muriatic acid, put in a damp place over night, then rubbed with a solution of sal ammoniac and saltpeter, and slowly heated over a thin red fire, but not allowed to get redhot. When the gold scale blisters the plates should be taken from the fire and the gold scraped off. Where the gold has not blistered should be treated with the solution and again fired. Collect the gold scales in an earthen dish, cover with nitric acid till all the copper is dissolved, when the gold can be smelted; after melting, corrosive sublimate should be used in the crucible till a blue flame ceases to burn.

S. J. S., Randsburg, Cal.: One can locate as many mining claims as he or she may be able to hold by proper development work. One can take up but one timber claim, under the law of 1878, and can use the pre-emption or homestead right only once; but this restriction does not apply to mining claims.

F. G., Rossland, B. C.: The following from the *Mining and Industrial Reporter* answers your question: To make canvas waterproof, dissolve one part of genuine beeswax in two parts of gasoline. Rapidly paint this on the canvas. The gasoline evaporates in a few minutes, leaving the beeswax in the fibers of the canvas, making it thoroughly waterproof. This method is cheap and very quick. Care must be taken that genuine, pure beeswax is used, as the cheap article will not do. The operation must not be done near fire or flame of any kind. It should be done in the open air. If done in a room where there is a flame or fire, even a lighted cigar, a dangerous explosion is almost sure to be the result.

C. B. H., Butte, Montana: In the recent publication, "The Law of Mines and Mining in the United States," by Barringer & Adams (1897), the following facts are given for the benefit of locators of mining claims: To enable any deposit of valuable ores or other mineral substances to be located as a lode claim, or, more accurately, to possess all the legal attributes of a true lode, there must always, in the opinion of the authors, be shown to exist a reasonable continuity of ore, or the accompanying mineral matter (gangue), presumably formed at the same time and by much the same agencies as the ore, both occupying some reasonably well defined main channel of mineralization, or there should at least be, in the judgment of trained and educated mining men of practical experience, a reasonable expectation of such continuity of ore. If the continuity and regularity cannot be shown to exist, and the expectation of it can be shown to be unreasonable, the deposit, in the authors' opinion, should be located as a placer claim, and the laws governing this class of claims should apply. The following is a legal, but not a geological or mineralogical, classification:

I.—*Stratified Mineral Deposits.*—A.—Regular: (a) Non-metallic—Coal, fire clay, asphalt, salt, gypsum, alum, potash, graphite, infusorial earth, quarries of stratified rocks, Chili nitrate, etc. (b) Metallic—Iron, manganese, aluminum, gold, tin, and platinum gravels. B.—Irregular: (a) Non-metallic—Asphalt, petroleum, natural gas, alum, banxite, borax, potash, phosphate rock, guano, quarries of rock not sedimentary, mineral paints, sulphur, etc. (b) Metallic—Iron, manganese, aluminum. Should be properly located when on Government lands, according to statutes governing this particular kind of deposit; or generally in the absence of such, or when not found to be in true fissure veins or as regular contact deposits in placer claims, and the law governing this class of deposits should apply.

II.—*Unstratified Mineral Deposits.*—A.—Regular: (a) Fissure veins or true lodes. (b) Regular or continuous contact deposits. Should be located as lode claims and the law governing this class of deposits should apply. B.—Irregular: (a) Discontinuous contact deposits. (b) Isolated deposits on limestone, etc.; also, terminable spurs or offshoots from lodes. (c) Stock work (when irregular, discontinuous and pockety). Should be located as placer claims, and the law governing this class of cases should apply.

A list of the more important minerals and metals which possess commercial value is also given by them, viz.:

Non-Metallic.—Alum, anthracite coal, asbestos, asphalt, barytes, bauxite, bituminous coal, borax, bromine, building stone, calcspar, cement, chromic iron ore, clay deposits (fire clay, brick clay, etc.), coal, corundum (emery), feldspar, flint, fuller's earth, fluorspar, graphite, gypsum, infusorial earth, iodine, lignite coal, limestone, magnesite or dolomite, marls, mica, mineral paints, mineral waters, monazite, natural gas, nitrate of soda, ozocerite, petroleum, phosphate rock, potash, precious stones, pyrites, rutile, salt, silica or quartz, soapstone, sulphur, talc.

Metallic.—Aluminum, antimony, arsenic, bismuth, chromium, cobalt, copper, gold, iron, lead, manganese, mercury, nickel, platinum, silver, tin, tungsten, zinc.

J. E. H., Los Angeles: Antimony occurs in California chiefly in Kern county. There is a mine three-quarters of a mile north of Havilah, at an altitude of 3400 feet, in which the ore, stibnite, occurs in irregular masses in a mineralized zone in the porphyry. Another is the Bousby mine, near the head of San Emidio canyon. The third is a group of small mines on Erskine Creek. The Grace Darling, Padre and San Emidio are also of some importance. The latter consists of nine claims in the southwestern part of the county. The ore averages 40% antimony, and carries silver, iron and arsenical pyrites. George Aitken has a mine about twenty miles from Mojave, and is now shipping to San Francisco antimony ore by the carload, which runs 55%. His is the only antimony mine at present operating in this State at a profit of which we are cognizant. His ore is sent to Mathison & Co., Staten Island, and goes by way of Cape Horn from this city. Mathison & Co. have not removed their smelter to San Francisco. There was what was called the Chaps Smelting Co., which removed from here some time ago; but it has recently been reorganized here under the name of the Chapman Smelting Co. Deposits of antimony are likewise found in Inyo county, on the west slope of the Panamint range, three miles south of Wild Rose Springs; also in Riverside county, three miles south of Riverside, where considerable stibnite of excellent quality has been taken out. In San Benito county, the Ambrose antimony mine is in the McLeod district. Here the ore occurs in a bunchy vein, varying in width from a streak to 2 feet, and is enclosed in quartz trachyte, the antimony being next to the hanging wall. This deposit is chiefly remarkable for the beauty of its crystallized masses. It yields about 50% of metallic antimony. In the Appeal mine, in the same county, the Gleason and the Star sufficient has not been found to justify working at higher than present rates. In San Luis Obispo county, on San Simeon creek, considerable antimony has also been produced, this deposit appearing as a short, bunchy vein in sand-stone. The Selby Smelting Co., of this city, handle only metallic antimony. So far as this paper is able to learn, the chief drawback to development of California antimony mines is the cost of transportation.

In working the assessment work of $50 under the new law, how many days' work will be necessary to comply with the law? or in other words, how many dollars a day is allowed in working assessment work? T. R. J.
Petaluma, Cal.

There is nothing specified in the law as to how many days' work is necessary, nor are the rates of a day's work stated. In this case it is customary to reckon the going wages in the locality—in Sonoma county it being $2.50 per day for miners.

Mills That Grind Slowly.

River improvement moves slowly and not wholly satisfactorily, but from the sluggish progress of events it seems possible that the original plan will be carried out, and that the work as indicated by Col. Mendell fifteen years ago will be taken up. General Wilson, Chief of the United States Engineers, in his report gives encouragement to the idea, wherein he says: "This matter of erecting restraining barriers is the most important feature of the scheme for improving the rivers, as only by such plans will it be carried forward. The Engineer Department will do everything in its power to forward river improvement work."

Some disquieting statements are made by General Wilson regarding appropriation matters, if correctly reported. General Wilson says, referring to the $250,000 joint appropriation made by California to aid and supplement the United States $300,000 appropriation in carrying on such construction as the United States Debris Commission of the State of California may approve: That while Congress has made the necessary enactment to enable the United States Government to receive that State appropriation, yet it has not been turned over to the Federal Government. It is to be hoped that Gen. Wilson is misquoted. It would be unfortunate were the Chief of the United States Corps of Engineers to get mixed up on this point, which is a very plain one, the only tangle being the interminable length of time that seems to be required to do anything in this matter. The California act which appropriated this money provided that whenever the United States Debris Commission had agreed upon plans and fixed upon specifications and entered into contracts for the work they deemed requisite, that the State Debris Commission should examine the same and report to the State Board of Examiners; and upon approval by that body as the work progressed the Federal Commission could draw upon the State Treasurer for money from time to time to the extent of $250,000; the expenditure of the money, certifying to its being due, etc., all to be under the control of the Federal Government.

As there has been no plan agreed upon, as the preliminary work is still in progress, it is not believed that any question need arise as to the turning over of the State money to the Federal Government. Such question has not heretofore arisen. The matter was so thoroughly understood as a joint proposition, and has been so thoroughly gone over heretofore, that it seems unnecessary to recount it all again at this time. As a matter of fact the work should be going on and payments made. How not to do it has heretofore seemed the rule. Meanwhile the untoward conditions that rendered all this appropriation necessary continue, and valley and mountain are unanimous in a desire that talk should cease and work begin. The money is ready and has been ready for years, and all this hemming and hawing and backing and filling is tedious and discouraging to those who have aided in securing the appropriation and to all who realize the absolute and immediate necessity of the work.

English Investments in American Mines.

To the Editor:—As a regular reader of your very valuable paper, I take this opportunity of saying that the editorial pages of your issue of the 27th ult. have been thoroughly appreciated by many of your subscribers on this side, and it is to be hoped that the comprehensive and admirable manner in which you have alluded to the subject "English Purchasers of California Mines" will be the means of helping to revive an interest in California mining ventures, that has for a long time now and until recently been but indifferently indulged in here. As you aptly say, "the question of the purchase of a mine is just as much a matter of scientific mining as anything else in connection with the industry," and, in corroboration of this, I find in your issue of the 4th inst., under the heading of "M. E's., E. M's. and Experts," the following very "fitting" sentence: "And let it never be forgotten that the mining engineer who is a commercial failure cannot be more than a very partial technical success." Your special reference to the term "prospect" and to the wider latitude that it obtains in California than that given to it here, is both interesting and instructive; but, for all that, it may, I fancy, fairly be maintained that the inclination in California is not generally prompted by your interpretation, but goes beyond it and bases values, not upon "information (knowledge) and belief," but upon "belief" only.

Now, as mining values, from a commercial view, even under the most auspicious conditions, are more or less difficult to determine equitably as between seller and buyer, would it not be an advantage if some fixed—so far as anything can be "fixed" that pertains to mines or mining—or recognized rules were applied to the value of properties coming under the name of "prospects?" For instance, a "prospect," though well located, but on which little or no work has been done, should not be valued, as such frequently is, far in excess of one not so well situated, but with much more to show in the matter of development work, and affording accordingly better opportunities for examination. I am not unmindful of the saying that the value of anything is just what it will bring; but by this method the "prospect" owner is seldom guided, for, while he expects the inquiring purchaser to increase his bid, he rarely realizes, at least until he has tired himself out waiting, that it is not impossible that his "prospect" may not be worth so much as he believes it to be, and during the time it has taken him to arrive at this conclusion he has been steadily disregarding the time-worn adage that "time is money."

In dealing with foreigners or foreign capital California mine owners invariably overlook the fact that nearly all capital looking for investment in mining adventures does so collectively, and not individually, consequently, what they (the Californians) lose sight of, or, rather, refuse to recognize, is that "collective" capital requires more in the way of inducement or encouragement to move it than is the case where individual capital becomes interested. During the past four or five years, and perhaps longer, there has been no difficulty in London for those disposed to risk money in mining ventures to loan it at from 8 to 15 per cent per annum, or, say, at an average of 12 per cent per annum on leading mining shares, with a margin on the market price of, say, 10 to 30 per cent. Now, so long as this can be done to almost any extent, it will be obvious to you that anyone here desiring to invest, say, £10 or £20,000 in mining, will prefer to put that sum out in the form of a loan against, say, the shares of a dozen different companies to simply "plumping" it in a prospect that might bring phenomenal returns in the way of profit or that might result in, not only no returns, but a total loss of the principal. It is not, however, the man with the large capital that nowadays either develops or advances any industry; it is the one with £50 or £100, who thinks he sees a chance of doubling his money by running the risk, on the "never venture never gain" theory, and as it is from such a source that money or capital for mining mostly comes, it can only be expected to come when circumstances would seem to warrant a reasonable prospect of profit on the essential preliminary costs of examination, organization, etc.

I regret to have to report that I learn privately from a friend that the shares of the Great Northern Industrial Gold Co., Ltd., (California), to which I referred in my last letter, have been but very indifferently applied for by the public. I am told that the promoters "attribute the non-success to the mine being in California and to the distrust with which mines in that State and in America are looked upon." These views may be partially, but only very partially, correct, as I am quite satisfied that had the mines in question been situated in either Africa, Australia or British Columbia, and been presented or offered to the public in the same way, the response would also have been disappointing to the promoters for the reason that there was a palpable effort on their part to push the issue on "names." The name of the company itself was a fit subject for adverse criticism, so also was the manner in which the directors and others were described in the prospectus. I hear of one or two other California mines that are to be advertised here soon with every promise of a successful outcome. RANDOM.

London, Dec. 27th, '97.

The Permanganate Gold-Recovery Process.

The permanganate gold-recovery process is attracting present attention in New Zealand, where it is deemed an improvement on the older methods of chlorination and "requires no special training or chemical knowledge in its application to suitable ores." In all previous processes of the same nature which have been generally adopted the chlorine is applied to the ore in a gaseous state. With the permanganate process there is no escape of the gas, and the liquid itself is pronounced harmless. The process is a modification of the Etard process, recently described herein. The nature of the Etard discovery was submitted to Dr. Black of the Otago, N. Z., University, who began a series of experiments to satisfy himself that in actual practice the process would accomplish what it promised in theory. The test was satisfactory, a drawback being that while one of the ingredients—hydrochloric acid—is a chemical of little or no commercial value in Europe (where it is allowed to run to waste from the alkali works), in the colonies it has considerable value. To find a cheaper substitute for this acid was the problem Dr. Black set himself to solve. He now claims to have found that sulphuric, a much cheaper acid, together with common salt in combination with permanganate of potash, will accomplish the work of gold extraction equally as well as the Etard solution and with greater rapidity. It is the Black modification of the Etard process which is now being shown to the New Zealand mining public. The ore upon which the process is shown in operation is from the Mount Morgan mine, Queensland, and is so refractory in its nature that it can only be treated successfully by chlorination. In addition to the ordinary sulphides which occur in most gold ores obtained from any depth the Mount Morgan ore contains sufficient copper to make the application of cyanide an impossibility. It is locally stated that an extraction of 92 per cent of the gold contents has been effected with the Black solution in fifteen hours by percolation and in five hours by agitation. Trials made upon bulk samples of one of the most rebellious of Otago, N. Z., ores—the blanket concentrates from the Barewood field—gave extractions of 95 per cent. These concentrates contain both antimony and manganese as well as the usual iron and arsenical pyrites.

How It Feels to be Asphyxiated.

To the Editor:—I have lately had some experience with mine gases, which came very near being fatal.

In our mine we sometimes have to contend with sulphuretted hydrogen, chlorine gas, carbonic acid gas, and marsh gas, sometimes called fire-damp; and lately have had all these to contend with at the same time and place. We had struck the ledge, finding, in addition to these gases, some petroleum, with a heavy flow of water, equal to about 4 miner's inches, when we were driven out of the tunnel by the excess of sulphuric acid gas, called by our miners sore-eye gas, owing to the fact that it affects the eyes so that the men are temporarily blind, and suffer great pain while the eyes are affected. We had discontinued work temporarily, while preparing to put in artificial ventilation. I and my brother went in to examine the tunnel. He had stopped to look at something about 250 feet from the breast. I went ahead to the breast carefully trying for carbonic acid gas along the floor with a candle, also along the roof of the tunnel for marsh (or inflammable) gas. I found neither with the light, but within a few seconds after reaching the breast, where a large flow of water was coming out of the ledge, I found that I was getting very short of breath. I tried to recover, but could not do so. My candle was burning brightly. I turned and ran back towards the mouth of the tunnel, perhaps 100 feet, at the same time calling to my brother to come to me. I began to get weak, lose consciousness, and fell to the floor. I could not rise again, although trying hard to do so. I felt just like one in a nightmare, trying to move, but unable to do so; but felt no pain whatever, not even strangling or coughing sensation. At this point my brother reached me, and pulled me back towards better air, where I revived within a minute or two. In this case asphyxia was probably caused by chlorine gas.

I have several times helped to take men who had been suffocated out of mines, and their faces and positions showed no signs of pain or any suffering. I had wondered at this, but now I know how a person might be asphyxiated while his light burned brightly, and would suffer no pain whatever to warn him of approaching danger.

PHILIP REARDEN,
Supt. Abbott Quicksilver Mining Co., of Illinois.
Sulphur Creek, California.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER II.

By Geo. F. Becker.

In a report made to the British South Africa Company, dated November, '94, Mr. John Hays Hammond describes the auriferous region of Matabeleland and Mashonaland as forming a high plateau along the main divide or watershed of the river systems of the country, being the source of the tributaries of the Limpopo and Sabi rivers on the south and those of the Zambesi on the north. This watershed trends in a northeasterly direction. The great bulk of the country Mr. Hammond reports as granite, the remainder being metamorphic schist, probably dynamometamorphosed igneous material. The schists constitute the gold belt of the country, and occur as broad bands and patches in the granite. It is chiefly in the region of intense metamorphism that the quartz veins occur, the walls usually being highly foliated chloritic schist. The auriferous belts extend for the most part in an easterly and westerly direction, with a width of from five to twenty miles. Mr. Hammond states that millions of pounds sterling worth of gold has undoubtedly been derived from the numerous ancient workings, all of which seem to be shallow. The ancients were probably unable to deal with much water or with sulphidized ores.

The gold fields of the northern portion of the Transvaal resemble those of Mashonaland and Matabeleland. The quartz veins are characteristically associated with schists and granite, and very often, according to Mr. Schmeisser, lie conformably between strata. One may perhaps suspect that schistose surfaces rather than planes of bedding have controlled the position of the veins. The schists for the most part strike east or northeast and dip steeply, as a rule, to the south. The gold fields lie at or near watersheds in the northern portion of the Transvaal, as well as in the British South Africa (or Chartered) Company's territory.

The schistose rocks of the northern Transvaal and the Chartered Company's territory are known as the Swasi schists. Their age is unknown, but it is supposed that they are Silurian. They are not dissimilar in appearance to portions of the Algonkian in the United States, and may in fact include several formations.

Along the southern edge of the auriferous Swasi area and unconformably upon it lies the Lower Cape series. It consists of numerous beds of silicified conglomerate alternating with quartzites and containing subordinate quantities of slate. Its age also is unknown, no definite fossils having been obtained from it. There is no doubt that it is Paleozoic, and a somewhat uncertain correlation with the rocks near Cape Town would assign it to the Devonian or the Lower Carboniferous. Mr. G. A. F. Molengraaff considers this series as divisible into a lower portion, which he calls the Old Schist formation, and the auriferous group, for which he retains the name Lower Cape. I saw no distinct evidence of such a division, though there is doubtless some faulting, and on Mr. Molengraaff's maps no such discordance displays itself. If it exists it would seem to be slight. His Old Schist occurs at the crest of the Witwatersrand and includes the Hospital Hill slates; it is not wholly devoid of auriferous beds.

The Upper Cape series lies unconformably upon the Lower Cape. This discordance, which I have had occasion to examine, is marked and very important to the technology of the district. The Upper Cape contains, close to its base, one auriferous conglomerate, the Black Reef, which at certain points has been successfully mined. An extensive sheet of dolomite overlies the Black Reef, and the dolomite is again overlain, in seeming conformity, by the Gatsrand series.

Overlying the Upper Cape are the coal-bearing beds of the Karoo. They are Triassic, or possibly in part Permian, and lie unconformably on the older rocks. They are nearly horizontal, almost undisturbed, and conceal the older rock over large tracts of country.

Character of the Main Reef Series.—The gold-bearing pudding stones, which make Johannesburg famous, are known as the Main Reef series, and occur in the Lower Cape formation. The gold is not confined to this formation, since the Black Reef is a member of the Upper Cape. Neither is the Main Reef series the only gold-bearing portion of the Lower Cape. All the conglomerates of this series, which is miles in thickness, seem to carry some gold, and, locally at least, some others besides the Main Reef series have proved fairly rich; but none which are yet definitely known not to belong to the Main Reef have become economically important. They have received various names, which are sometimes inconsistently applied through erroneous hypotheses of continuity. Immediately about Johannesburg the more prominent groups of conglomerates of the Lower Cape forma-

*Eighteenth Annual Report Mineral Resources of the United States.

tion, in ascending order, are known as the Main Reef, Bird Reef, Kimberly Reef and the Elsburg series. The intervals between these groups of conglomerates, measured across the croppings, are approximately 3000, 5000 and 10,000 feet, so that the Elsburg series is over three miles from the Main Reef. The distance measured perpendicularly to the stratification is, of course, much smaller and averages somewhat less than one-half of the horizontal distance. In any one section the various puddingstone beds can be distinguished by the size and color of pebbles, the appearance of the matrix and the like. Some miners think they can recognize the Main Reef series at any distance from Johannesburg by the appearance, but little faith is to be placed in such identification, inasmuch as on any continuous stratum of the pudding stone, followed along the strike, the lithological character varies. This I have had many opportunities of observing.

(To be Continued.)

The Bennett Amalgamator.

On various occasions the MINING AND SCIENTIFIC PRESS has devoted some attention to the placer machine and amalgamator invented by E. S. Bennett, an experienced miner and machinist of Denver, Colo. In the issue of December 14th, 1895, appeared an illustrated description of the machine as produced by Mr. Bennett at that time. Since then experiments and practical tests have been made, followed by such improvements in the amalgamator's mechanism as those tests showed were advantageous. As a result it is now considered that the machine has been perfected to such a degree that it will practically and economically save the particles of fine flour gold, which by the ordinary methods of hydraulic mining are admitted to be lost. The perfected machine has been evolved from the patient labors and experiments of the inventor covering a period of twenty years.

One of the first machines was seen by Professor Silliman of Yale College, who on March 1st, 1880, wrote Mr. Bennett as follows:

"I contemplate with great satisfaction this invention of yours, which appears destined by its remarkable success to develop anew the 'Age of Gold.' From what I know of the dormant resources of the country, in placers now idle for want of just such means of treating the sands, I shall not be surprised to see the annual product of gold gradually and rather rapidly rise until it meets fully the output of the early historic years of California and Australia. It is perhaps not too much to say that, in my opinion, your machine stands in relation to the ungarnered crop of gold in the auriferous sands as the cotton gin of Whitney stood in 1800 to the then almost valueless crop of cotton."

The original machine was on wheels hauled by two horses, furnished water by a small engine and pump, the dirt being supplied by horses and scrapers. It did good work in Summit county, Colo., and on the Arkansas river near Buena Vista. There the sand left in the sluice boxes used readily to sell for $10 per ton; but local chronicles state that the sand left after the Bennett amalgamator had extracted the gold was considered worthless.

The next machine was set up in Newland's gulch, about twenty-five miles from Denver, where its operations proved the success of the principles on which the machine was constructed, as it saved the particles of gold which could not be saved in panning; but, owing to the imperfect method of handling the gravel and other unfavorable conditions, the work was not wholly satisfactory. In the new machine, as it stands to-day, whatever minor defects that existed in the old have been corrected. It is the embodiment of a scientific idea mechanically demonstrated.

For ordinary placer mining in gravel beds, on bars, in gulches, or on side-hills, the amalgamator proper is mounted upon a steel-bodied car, and requires a power plant for operating. An electrically-operated shovel gathers the sand and gravel, feeding it into the amalgamator, the waste from which is deposited in winrows on the cleaned up bedrock to one side.

For river-bed or lake-bed mining the same class of machines is mounted upon a steel barge. In this case an electrically operated dredge conveys the sand and other material containing gold particles from the banks, bars and beds under water.

The amalgamator, which is interesting in mechanism though not complicated, consists of a main tank, cylindrical grate and sieve, tailing tank, feed-water pipes, jet nozzles, agitator and amalgam plates. The main tank is 27 feet long, 13 feet wide and 60 inches deep. The bottom has two parallel V-shaped depressions which pass from end to end. The bottom surface has a slant or fall of 1 inch to the foot. One end of the tank stands vertically and the other outward at an angle of 45°. The tank is lined with silver-plated and corrugated amalgam plates in such a manner as to form a series of steps or riffles on side and end surfaces from top to bottom. The steps formed by the corrugations have an inward inclination of 15°, thus forming receptacles or pockets for mercury in bulk. The V-shaped valleys or depressions in the bottom likewise are amalgam-plated and catch the overflow of mercury from the corrugated surfaces above. The cylindrical grate, 9 feet in diameter, revolves at the front end of the tank with one-fourth of it submerged therein. The inner surface of this cylinder is provided with a double screw-like conveyor. The material is fed at one end of the cylinder and the coarse gravel and rocks are carried by the revolving screw-like surface to the opposite end, where they are discharged. The finer material, containing the pay dirt, passes through the inner or coarse cylindrical grate into the space between that and the rim. The outside or rim of the cylinder forms a still finer screen, through which the still finer materials pass, the refuse gravel being carried out by the same kind of screw-like conveyors as those fixed to the interior of the coarse grate. The cylinder revolves about seven times per minute, its load of gravel and sand always being submerged in the tank of water whose surface is described above. The material which finds its way through the two cylindrical screens contains, as a matter of course, all the free gold, both coarse and fine. In its course thus





THE BENNETT AMALGAMATOR.

far the materials have become thoroughly scoured and they are submitted to still more violent agitation in the tank by the action of the water, which is given an advancing spiral motion from a point beneath the cylinder to the tailing tank by a system of jets. The water thus used is forced into the machine at high pressure through the jet nozzles in the bottom of the tank. The heaviest gold particles soon gravitate to the mercury-coated valleys in the bottom of the tank; the lighter ones may be caught on the corrugated surface. The lightest particles which are held in suspension in the water cannot escape contact with the side or end plates and are as surely caught as though they possessed greater gravity. By this device, which cannot be more minutely described in this article, tests have been made whereby have been saved not only the coarse gold but the infinitesimally fine particles which by ordinary hydraulic methods are lost, but which no doubt constitute 90 per cent of the value of the world's placers, taken as a whole.

In the absence of a supply of water by gravity steam pumps are used to convey water to the machine. In some localities artesian wells can be obtained, while in others a sufficient supply of water can be developed from the underflow of rivers, or pumped from lakes or large wells, since the plant is arranged to use the water over and over, if necessary. It is demonstrated by actual work in the field that by this machine the gravel can be handled with forty gallons of water per cubic foot of material, as against 1000 gallons required by the ordinary hydraulic method. The cost of handling gravel with these plants is from 2 to 3 cents per cubic yard.

The smallest standard size plant has a capacity of 2500 cubic yards per twenty-four hours, and includes a 200 H. P. engine and boiler, a 100 H. P. dynamo and five electric motors, and, complete, costs $45,000.

The shovels are so constructed as to dump the material into the hopper on the rear platform, thus obviating the necessity of a double track. Leveling devices enable the operators to maintain the body of the car in a level position. They can be raised to any desired height above the track and a new track laid. These devices also permit the machine to pass over hummocks too hard to dig through. They are also equipped with a device for creating lateral motion, by which they may be shifted from one track to another. They are of the dipper type, the bottom opening and closing automatically at proper points, thus doing away with the need of a man with rope connection to open the dipper. Chains have been dispensed with and crucible steel wire rope, 6 inches wide, substituted. The structure is almost entirely of steel, and so framed and jointed as to have the requisite stiffness and solidity to withstand extraordinary usage.

This $45,000 machine is somewhat of an advance from the first one, which cost $20—this simple statement sufficiently illustrating the growth of the original idea. It may be added that it requires but four men to run the entire plant and power may be transmitted over a wire from a point twenty miles away. In brief, the points claimed are perfect saving of the values, maximum capacity with minimum cost of operation, reliability and durability, ability to treat ground where water is scarce, or where dumping facilities are lacking, where gold is so fine as to be ordinarily unprofitable, and to work on such a large scale as will insure profit.

Those familiar with hydraulic mining by the usual method agree on four principal requirements for profitable work, viz: good ground, coarse gold sufficient to insure a profit, even with the loss of the finer particles, an abundance of water at proper elevation to give requisite pressure at nozzles, and dump room for tailings. The absence of any one of these destroys the profitable character of the work. The areas of placer ground having all these requisites have never been great. They are now more limited than ever before. It is beyond question that 95 per cent of the placer ground in the west half of America is lacking in one or more of these essentials. Any machine or process which effects a saving of 90 per cent of the fine gold which was formerly lost, which to a degree overcomes the water question as considered in connection with ordinary hydraulic methods, which makes it possible to work profitably the vast areas hitherto considered unprofitable, will certainly stand Prof. Silliman's comparison of the Bennett amalgamator with the cotton gin. The Bennett amalgamator, as at present constructed, has not been submitted to the tests of time, nor have experiments extended to all conditions, but in localities where it has been operated the result has been a saving of not only the coarse gold, but the minutest particles of flour gold held in suspension in water. The conditions under which tests have been made are believed to have been representative of placer grounds generally. There is no apparent reason why the practical demonstrations thus far made cannot be carried forward to the point of making profitable those immense areas of gold-bearing gravel where hitherto all attempts to work them have resulted in loss and despair.

The Bennett amalgamator's construction and work involve no new principles, but afford a scientific demonstration of well known laws in hydraulics and gravity.

W. A. SCOTT.

Denver, Colo., Jan. 10th, '98.

English Investments in American Mines.

TO THE EDITOR:—I am much amused at the recent communications in your journal concerning brokers, foreign syndicates and this sort. To any one conversant with this business, none of the parties to the discussion seem to know anything of the subject—not even the English correspondent. The latter speaks of his syndicate being willing to give $500,000 for a mine, but the wicked owners held out for $750,000, on which he reads them a pretty lecture, well-deserved if there was such a property, or if he had a real syndicate behind him. He speaks in good faith evidently, but he is near enough home to know better. There are no "set" syndicates in London wanting mines to invest in; there is not a syndicate in all England with $750,000 of its own money to put into a mine anywhere—above all, one in the United States. Rich men will not be bothered with a mine at a distance, but they will sometimes pretend they want such a property, and if they do, it is not to keep but to float on the market. These companies are frequently quoted as being after this and that; we admit they may be, but they never purchase, but only get bonds and sell to the general public.

So when your English correspondent or others of his ilk in this country speak of their Eastern or foreign backers with millions to put into mines, they make those within the pale, smile. * * * * M

San Francisco, Jan. 5th, '98.

Selection, Handling and Care of Belts.

By CHARLES H. GARLICK.

Nearly every engineer has one or more belts under his care, and from the condition many of them are in it would seem that a word of advice as to their selection and care would not be amiss.

If when in need of a belt the engineer would, instead of simply ordering a certain number of feet of a certain width and thickness, try the experiment of personally selecting the same for the work which he wishes to have the belt do, and then use the same care in placing the belt in use that he does in starting any other piece of new work or new machine much better results would be obtained than is usually the case. There are many, very many rules and formulas for ascertaining the width of belt necessary for transmitting a certain amount of power. No two of these rules agree, because there are so many conditions that enter into the problem that no hard and fast rule can be used.

From the writer's experience he prefers to use the following formula, which in ordinary cases will be found nearly correct:

$$W = \frac{H.\ P. \times 5500}{Velocity \times contact\ in\ feet.}$$

This is single thickness. For double thickness belts:

$$W = \frac{H.\ P. \times 3600}{Velocity \times contact\ in\ feet.}$$

Or the width of the belt can be found by multiplying H. P. to be transmitted by 3600 and dividing the product by the number of feet of the belt that will pass over the pulley per minute multiplied by the number of feet of belt in contact with the driving pulley. A very good "rule of thumb" for single belts is: Belting 1 inch wide having a velocity of 600 feet per minute will transmit one H. P.

It should be borne in mind, however, that the width of the belt necessary to transmit a certain H. P. depends on several conditions, one of which is the tension of the belt. When a belt is too tight there is a constant waste in journal friction, and when too loose a great loss in efficiency from "slip." A belt should be procured that will deliver the power required in a fairly slack condition.

Between a slow speed and a wide belt and high speed and a narrow belt, choose high speed and narrow belt wherever practicable, in designing for the transmission of power. A velocity of belt up to a mile a minute is practicable and advantageous.

In taking lengths for belts where it is not convenient to measure with a tape-line the length required, this rule will be found of service: Add the diameters of the two pulleys together, divide the result by 2 and multiply the quotient by 3½; add the product to twice the distance between the centers of shafting and you have the length required, very nearly.

In buying be sure that the leather is oak tanned, has a smooth, polished surface and a fine fiber. It is a good idea to have the belt unrolled and examine it to see that laps are thoroughly made and fastened. Note whether the belt is of the same uniform thickness throughout its entire length, also that the belt is pliable and not harsh and brittle. Note if possible whether the hides which make up the belts are of uniform thickness or whether the thickness of belt is obtained by splitting the hides, and if the latter is the case reject it.

As to whether you purchase single or double belts it may be said that single belts can be used successfully up to 12 or 14 inches in width, but where more power is required than a belt of this width will transmit under the conditions that exist in your plant, belts of double thickness should be used. With single belts care should be taken to have them of ample width so that there need be no necessity of having them tight. Double belts should be used when a great strain is to be put on the leather, or for slow speed, or when a belt is to be run at one-fourth turn, belts which you are called upon to shift frequently, or which are to run on vertical shafts, should be double.

As to the respective value of rubber or leather belts: Rubber belts do not cost as much as leather, nor do they, under favorable conditions, last as long. They cannot be used in places where the belt rubs, nor where it becomes necessary to shift often; neither can they, as a rule, be run successfully as cross belts. They should not be used where oil is likely to drop on them, nor where they will freeze. They usually last longer than leather belts in damp localities. Rubber belts will adhere to pulleys better than leather. When a rubber belt commences to wear out it is almost impossible to do anything to repair it. Having purchased a new leather belt, it should, if time will permit, be stretched before being placed in work. This can be done in a variety of ways that will present themselves to the engineer, depending on the width and length of belt and the time at the engineer's disposal. One way is to stretch it over two pulleys placed some distance apart and attach weights to either end of the belt. During the stretching period a little oil should be applied to the leather.

Belting for electric lighting machinery must have some characteristics all its own. For ordinary machines a positive steady motion is not absolutely necessary, but with an electric plant it is different. It is necessary for the belt to be endless and of a uniform thickness. Even so small a thing as uneven laps will cause a slight but constant jumping or flickering of lamps. With most dynamos as built to-day provision is made for the purpose of taking up any stretch that may occur in a properly constructed, designed and well-stretched belt. Yet should it become necessary to shorten one of these belts it may be done by using clamps. Care should be taken and the laps made as long as possible, and sufficient time given the work before removing the clamps.

While endless belts are to be preferred for almost all work, yet in many places the time, care and experience required to join them is such that recourse is had to the more convenient method of lacing or fastening with clamps or hooks, and of all the different methods the writer has been more successful with and prefers lacing. But even such a simple piece of work as that of joining a belt by means of a lace—a narrow strip of rawhide—is sometimes done in a manner as to very materially reduce the life of the belt, and very seldom is sufficient time or care given to this work. The ends of the belts should be cut exactly square, using an ordinary tri-square for this purpose. Punch the holes exactly opposite each other in the two ends of the belt to be joined. It is best to use an oval punch for this purpose, the longest diameter of holes being parallel with the belt. Two rows of holes should be made in each end of the belt, the same being staggered. The edges of holes should all be at least ¾-inches from the end or side of belt; be sure and keep the belt square and lace both ends equally tight. The laces should not be crossed on the side that run next to the pulley, but on that side laces should run parallel with the belt. Fig. 1 shows the inside of the lacing, or the side that

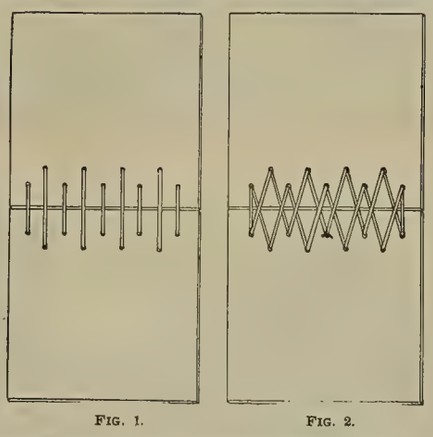


FIG. 1. FIG. 2.

should run next to the pulleys, and Fig. 2 shows the outside of the lacing, the side that is not in contact with the pulley.

In placing the belt on pulley, put it on so that pulley in slipping will run with, and not against splice or joint. While authorities differ as to which side of the belt should be placed next to the pulley, the writer's experience has been that the best results are obtained when the grain side is placed next to the pulley. Experience has proven that it will drive more than when the flesh side is in contact with the pulley, and that the belt will last longer.

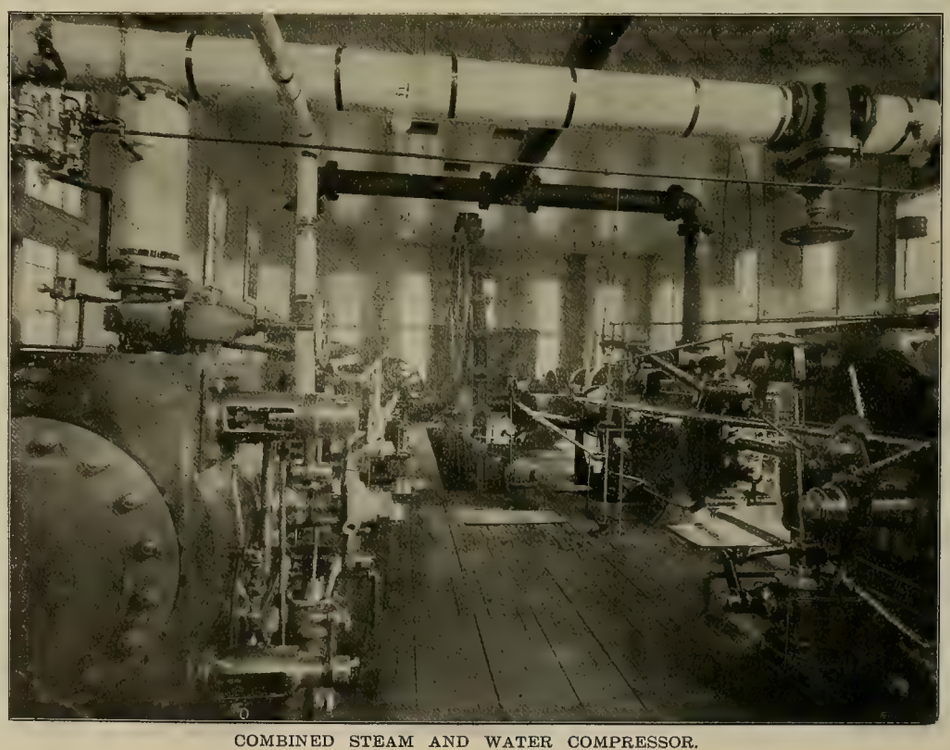
If the belt is to be crossed, do not put it on in such a manner that at the places of passing joints or laps will meet and be turned up and ruined in a short time.

How to place a belt on a pulley is one of the little things one can become an adept in only by practice. If the belt is a heavy one and the pulley runs at a high speed, it is best to slow down the machine, then place the belt on the loose pulley or the pulley at rest. Secure a firm footing and with the right hand slowly work the belt up to top of pulley, when a quick jerk down or up, according to the direction the pulley is running, will throw the belt on. When the belt is heavy, or the operator lacks experience, it is best to shut off the power, place the belt on pulley as far as possible, then take a small leather belt, or even a rope, double it, slip one end through the arms of the pulley and around the belt and rim of the pulley ane the other end through the loop formed by the doubld of the small belt or rope; then stand on the floor on the opposite side and draw on the small belt or rope, when the belt will be drawn to the rim of the pulley. When the machine is placed in motion, the belt may be slipped on without any trouble; then by letting go of the small belt or rope when the belt is on the pulley, the noose will be undone and the small belt will be free.

If the belt does not stay on the pulley do not erect guards to keep it on, as they are an eyesore, and soon wear the belt out. Besides, the guards simply cure an effect while the cause remains. The cause may be that the pulley is not in line, or that the belt is not joined squarely, or one side is stretched more than the other. Sometimes a belt running at high speed, transmitting scarcely any power, will wave from one side of the pulley to the other, and if a load is not thrown off will eventually come off. In places where it was not convenient to either put in pulleys of larger diameter, or even wider belts, and where the use of resin, oil and other adhesive matter would not cause the belt to adhere to the pulley, the difficulty has been overcome by running a narrow belt drawn tightly, with ends laced, over the main belt. In one place where occurred a continual slipping of a 10-inch belt the writer took an old 2-inch belt, placed it upon the 10 inch, and the two belts carried the load for years without trouble.

A Combined Steam and Water Compressor.

The cut below illustrates a recent installation at the Alaska-Treadwell mine, Douglass Island, Alaska. This consists of a Duplex-Reidler Compressor, with air cylinders 24 inches in diameter by 36-inch stroke, driven by a horizontal, cross-compound condensing engine, with steam cylinders 24x38x36 inch stroke. The steam cylinders are placed behind the air cylinders, the piston rods being connected by threaded couplings in halves, admitting of disconnecting when operating by water power. The compressor has a capacity when running at seventy-five revolutions of delivering 2800 cubic feet of free air per minute. The wheel is 22 feet in diameter, direct con-



COMBINED STEAM AND WATER COMPRESSOR.

nected to the shaft of the compressors, serving the purpose of a fly-wheel as well as prime mover. It weighs a little upwards of 25,000 pounds, and running under a head of 480 feet at a speed of seventy-five revolutions, develops upwards of 500 H. P. An hydraulic speed regulator is attached to the wheel, which controls its movements so that a uniform air pressure is maintained on the receiver at all times. This is believed by the builders to be the largest tangential wheel ever constructed, and shows the remarkable facility with which Pelton wheels can be adapted to unusual and extraordinary conditions. In a case like this the transmission machinery to carry such an amount of power would involve a heavy outlay, as well as constant expense in maintenance, besides material loss in power. A direct connection of water wheel to machinery to be operated without intermediate gearing is, therefore, obviously of great advantage whenever possible. The superintendent of the above company reports this plant as working very smoothly and with a high degree of efficiency, saving fully 20 per cent in power over the usual means of transmission by rope drive. The compressor and engines were furnished by Fraser & Chalmers, of Chicago, and the wheel by the Pelton Water Wheel Company of San Francisco.

Indestructible Big Cannon.

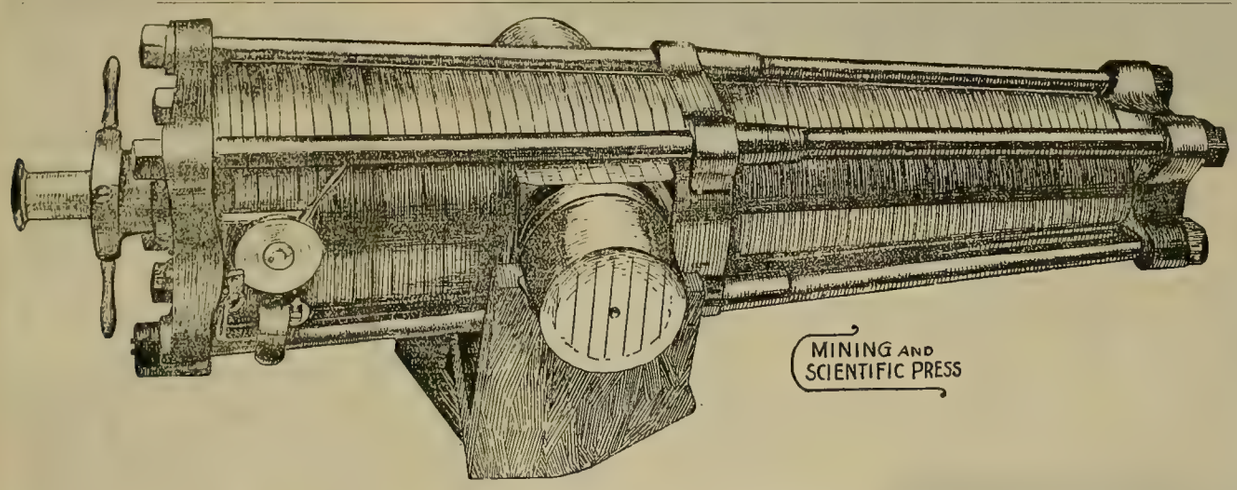
Experts of the United States Ordnance Department have under consideration a new gun that is expected to revolutionize the art of cannon making. The inventor, Edwin T. Blood of Chicago, says:

"The gun is constructed in sections of moderate weight, each section being made, not of cast, but of rolled steel disks, carbonized to the desired degree. Each section is ring-shaped and of a size to match the central steel tube, which is forced into place through these rings by hydraulic pressure. The sections are held immovably together by means of steel rods which are bolted on crossheads at each end. The largest and heaviest part of the gun is the central tube of thin steel containing the bore. The simplicity and ingenuity of this arrangement of steel tube fitting into steel rings of tapering size will be seen at once. When the inner tube expands with the heat it is only clasped the closer in the embrace of the steel rings which take up the heat. When the gun is cold the rings are tightened by the inner barrel being pressed into the rings by hydraulic force, the indicator on the hydraulic pump used for this purpose showing the degree of force applied. By this means every square inch on the surface of the tapering inner barrel is subjected to exactly the same pressure. Hence, the initial tension imparted to the outer steel disks is regulated and distributed throughout the body of the gun with exact nicety, and can be relaxed at will, relieving the gun from the strain of a high tension when desired.

"It is a well authenticated fact, capable of demonstration in many ways, that vibrations produce changes in the molecular construction of metal, causing granulation and crystalization. In this cannon the seams between the disks forming the body of it check the vibrations produced by the explosion of powder on the same principle that a fracture in a bell checks its vibrations. Hence these disks will not crystallize, and being of the finest fiber under equal tension, they guarantee great durability.

"In case the inner barrel is powder-burned or its rifling impaired, it can be quickly removed and a new one supplied, making practically a new gun.

"Another important feature is, it can be built in a fraction of the time now required to build cannon by any other known method. By this system it is practicable to build a gun of 22-inch caliber in a much shorter time than it is possible to build a gun of 10-inch caliber by the present methods."



CANNON MADE UP OF SMALL PIECES.

Geology of the Yukon.*

NUMBER I.

A voluminous report regarding Alaska is the publication entitled "Geology of the Yukon Gold District of Alaska" by Josiah Edward Spurr, of the United States Geological Survey. The book contains all that the geological survey has been able to obtain regarding Alaska, and is complete in its minute details and description of the various rocks and geological formations of interest to the expert. Mr. Spurr and party went from Juneau up the Lynn canal, across the Chilkoot pass to Lake Lindemann, and thence by boat to the gold mining district. They went down the Yukon to Nulato, thence to St. Michaels and home by Unalaska. H. B. Goodrich, accompanied Mr. Spurr and he makes a specialty of some features of the report.

The report contains a long description on the movement of the earth's crust, describing the migration of material surface through atmospheric agencies. It says among these processes, however, regional movements producing the uplift or depression of great areas and the folding or faulting of the superficial rocks are primarily important, since it is largely upon these that the minor adjustments depend. The features of general importance in the history of rock formations along the gold belt in Alaska are, so far as is imperfectly known, as follows:

The notes which have been made upon the geology of the Yukon gold belt indicates that the geological column in this region begins with the fundamental granite which overlays all thick quartzites; that this quartzite series is overlain by imbedded sedimentary rocks which were regional sandstone, limestone and shales. All these rocks have been subjected to regional pressure, and all have been rendered schistose together. The effects of the shearing, however, are much more marked in the sedimentary rocks than in the more massive granite. At about the same time as the development of the schistose, probably near the beginning of this process, dikes were intruded into the sedimentary rocks and quartz veins were formed. The series of igneous injections thus begun continued for a long period of geological time, and did not cease until after the end of the movements in the rocks which gave rise to the schistose structure. The first dikes which were afterward rendered schistose by the subsequent regional movements were granitic or dioritic, while later dikes, as a rule, were more basic and more acid, and the final injunctions, so far as observed, were of extremely acid dikes, associated with the quartz veins. Previous to the intrusion of these very latest dikes, but at a period when the development of schistosity was nearly at an end, there occurred vast outpourings of basaltic and dibasic lava over large areas, and these igneous rocks were tuffs and impure sandstone largely derived from them, and constituted a very thick series. This volcanic activity seems to have been very nearly to the end of the period of disturbance which had been manifested by the shearing, folding and injunctions of igenous material. Subsequent to the outpouring of the lavas, however, dikes were still intruded, as is proved by the occurrence of these bodies cutting the effusive rocks. But these dikes seem to belong generally to the extreme types which characterize the close of the series of intrusions.

The quartz veins which occur in the district seem to be closely connected with the dikes, and were probably formed at successive periods corresponding with the repeated injunctions of igenous material. Therefore, the oldest veins have been sheared, together with the oldest dikes and the inclosing rocks, and have been followed and stretched so that they are characteristically narrow and nonpersistent, and difficult to follow. The latest veins, however, which accompanied the latest granitic and aplitic intrusions, are, like these dikes, unsheared and practically unfollowed, and therefore may be not placed wide and persistent. All these veins seem to carry gold in varying amounts, and they probably are the chief source of the gold now being taken from placer diggings.

Following the period of the great lava eruptions, limestone and other sediments were laid down, succeeded by more shaly and conglomerate beds. These sediments are largely marine, but have occasional leaf beds, indicating fresh water conditions, and scattered fossils show a range probably from Devonian to Eretraceous. Above these sediments was laid down a very thick series of fresh-water beds, which are largely conglomerate containing abundant plant remains and seams of lignitic coal. This series, on the evidence of its flora, has been referred to the Eocene. Subsequent to the formation of this conglomeratic series, violent movements took place in the earth's crust. Great folds were formed, among them that which has been named the Yukon gænticline, which has a northwest and southeast trend. The beds were upturned and the development of the Alaska of the present day began. By erosion of the Yukon gænticline the different formations were exposed in northwest and southeast trend zones. This is especially the case in the lower schistose gold-bearing formations.

(*To be Continued.*)

*Condensed from advance sheets of "Geology of the Yukon Gold Dist. of Alaska," by Josiah Edward Spurr, of the U. S. Geo. Survey.

Most Convincing Proof.

To the Editor:—Your valuable paper of November 20th, 1897, contains an article headet "The Divining Rod Finds a Champion." It appears to me, that you are a sceptic, therefore i wish to convince you, that both mettals, gold and silver, as well as water can be found with help of a divining rod. I beg you therefore to please give me an opportunity to proovve to you, that i, with the use of a divining rod, witch is really a magnet, with certainty can locate both mettals at distinces up to ten miles or (of my own invention and make).

At this distance i locate blind veins or cropping out, i can give the acurate depth below the surface and with of the mineral bearing part. i can follow anny vein from beginning to end, find burried money. I blame no person for being sceptical, and would not believe the above could be accomplished, if i could not doo it myself. i am 74 years of age, and not strong enough to use my invention for profit, there being a great many fakirs here in california, causing poeple to become sceptics.

Yours truly, A. B A HN.

San Diego, Cal., Jany. 18th, 1898.

Jan. 31st Will Be "Miners' Day."

J. F. Halloran, 330 Market St., City: On Monday, Jan. 31st, at the Golden Jubilee Mining Exposition will be a day known as "Miners' Day," when all miners of the State of California are expected to assemble in the Pavilion and enjoy themselves.

The Southern Pacific Railroad has kindly consented to extend the cut rates until the 4th of February, so as to enable all miners to participate in this celebration at the Pavilion and be enabled to return home on the excursion rates of tickets.

It is sincerely hoped that a large concourse of miners, their wives, mothers, sisters, daughters and sweethearts will assemble on that day and make of it a grand success, which it richly deserves. Very truly yours, Julian Sonntag,

Sec'y California State Miners' Association.

Geographical Society of the Pacific.

At the annual election held Jan. 18th in the rooms of this Society, in the Merchants' Exchange Building, California St., the following members were elected to serve during the current year: Directors—Prof. George Davidson, Charles L. Taylor, John Dolbeer, Edgar J. Bowen, Louis L. Nelson, John Partridge, H. Durbrow. Councillors—Ralph C. Harrison, Mark Sheldon, William Hood, Charles Goodall, James F. Houghton, Gustave Niebaum, Senator George C. Perkins, Henry Lund, Irving M. Scott, Jeremiah Lynch, Adolph Sutro, F. S. Cook.

Electrical Progress.

Electric Locomotive on the Hoboken Shore Road.

The use of electricity for switching purposes on a steam railroad, in place of the noisy drill engine, takes another step forward, this time on the Hoboken Shore Road, Hoboken, New Jersey.

The new electric locomotive was put into regular service on the 4th inst., hauling trains of loaded and empty freight cars between the docks and the Erie track. The difference in its operation from that of the common drill engine is immediately noticeable. The electric locomotive responds instantaneously to the movement of the controller handle and starts without jerk or noise, tightening up the couplings uniformly or coupling the cars together so gently that no blow is perceptible. The locomotive was constructed in the shops of the General Electric Company, at Schenectady, New York, and somewhat resembles in appearance several other electric locomotives built by them. It is mounted on two four-wheel trucks, each axle carrying a General Electric 2000 motor, giving the locomotive a total of 540 rated H. P. The weight on the drivers is 57,200 pounds; the draw-bar pull is 10,000 pounds. The locomotive is driven through a single reduction gear of a very low ratio. The speed is correspondingly low, and is rated at eight miles an hour when hauling a heavy load.

At each end of the locomotive is an automatic coupler, and a small railed platform for the brakeman in charge of the trolley pole. The cab is of iron and resembles a double steam locomotive cab, with a sloping tender shield at each end. Drop windows are set around the four sides of the cab, affording an unobstructed view in all directions to the motorman. On each shield is a headlight; in addition one shield carries a bell, the other a chime whistle. Beneath one of the shields are four packed card resistances, two sand boxes, the compressed air tank and the equalizing air tank; beneath the other, eight resistances, two sand boxes and the engineer's tool box. At one end of the cab is placed a controller of the series parallel type known as the L-2. It contains a magnetic blow-out, and is arranged to operate the motors either four in series, or each two in series-multiple. Besides the controller is the air-brake handle and the two valves of the sanding arrangement, by means of which the sand is blown by the compressed air under the wheels.

In front of the motorman is an air-brake gauge, and above it an ammeter reading to 500 amperes. Fastened to the roof of the cab is an L automatic circuit breaker set at 500 amperes. On the other side of the controller, from the motorman, is an M circuit breaker and an automatic governor switch for the air pump placed at the other end of the cab. This is a single cylinder pump driven by a 3 H. P. iron-clad bipolar slow-speed motor. The operation of this air pump is automatic. When the air in the tanks is at normal pressure the governor switch is opened. Blowing the whistle, applying the brakes, or using the sander, causes the pressure to fall. This closes the switch automatically and starts the motor and pump.

The overhead wire is 00 suspended from wires strung between octagonal cedar poles, except at two or three points, where bracket construction is used. Where the locomotive turns in from Hudson avenue to the river walk, a peculiar condition has caused a special method of bracket construction. It was necessary for the overhead line to be so set as not to infringe upon the limit of the next property. Thus, at this point, the overhead line is suspended from two bracket arms, one 6 feet and the other 18 feet long.



GENERAL ELECTRIC COMPANY'S LOCOMOTIVE, HOBOKEN SHORE ROAD, HOBOKEN, NEW JERSEY.



INTERIOR OF CAB, GENERAL ELECTRIC COMPANY'S LOCOMOTIVE.

According to the *Electrical Review*, T. A. Edison is looking for more worlds to conquer. In its issue of the 5th inst. our New York contemporary says: "Edison, satisfied with the success of his iron mining, is now ready to enter the field of gold placer mining. Contracts have been in his desk for six months awaiting his signature to begin this work. It will be entered upon where the low-grade gold deposits are vast and extensive, as the construction of the mills is very expensive. Many discarded placer mines will undoubtedly become very valuable because of Edison's new process."

Mechanical Progress.

New Boiler Setting.

A newly invented form of boiler setting has for its object to prevent the crumbling or crushing of the setting from undue expansion. It is applied to that class of boiler settings comprising a main or inner wall and an outer wall, with an air space between these walls, the boiler being provided with the usual boiler lugs, which rest upon suitable rollers on a ledge in the inner wall; in the improvement special pains is taken to so set the boiler that not a particle of brick work is in contact therewith, so that the expansion of the boiler is perfectly free and unobstructed. The air space extends between the walls at the sides and at the back, and it also extends from the bottom up through the top of the setting and opens into the outside air, wire netting being provided across this space at the top so as to prevent foreign matter from dropping down into the same and clogging the space. Openings extend through the outer wall at opposite sides of the setting and lead into the air space, so that communication is afforded between the outside air and this space, whereby the latter is kept supplied with fresh, cool air; and for the same purposes openings are provided in the back of the outer wall. The air space extends through the main and outer walls at the front of the setting and is closed by the front plate, this space being provided with a jog at the front in order to bring the space within the limits covered by the plate. Openings are provided in the front of the outer wall and extend into the air space, so that fresh air is also supplied to the space at the front of the furnace.

Thus it will readily be understood that this air space completely encompasses the main wall, and that the space throughout its entire length opens into the outer air at the top, and that fresh, cool air is constantly supplied to said space. Heretofore the air spaces have been provided around the main walls but such spaces have been closed entirely at the top, except that one or more vents have been provided through which the air which has become heated is discharged. In such constructions but very little benefit is obtained from the air spaces, whereas in this improvement fresh, cool air is continually surrounding the main walls, the air, as fast as it is warmed, ascending up through the top of the spaces.

The following process, invented by Mr. Rubbineck, for metallizing wood, is thus described by *Les Mondes:* "The wood is first immersed for three or four days, according to its permeability, in a caustic alkaline lye (calcareous soda) at a temperature from 75 degrees to 90 degrees. From thence it passes immediately into a bath of hyposulphite of calcium, to which is added, after 24 or 36 hours, a concentrated solution of sulphur in caustic potash. The duration of the bath is about 48 hours, and its temperature is from 35 to 50 degrees. Finally the wood is immersed for 30 or 50 hours in a hot solution (35 degrees to 50 degrees) of acetate of lead. The process, as may be seen, is a long one, but the results are surprising. The wood thus prepared, after having undergone a proper drying at a moderate temperature, acquires under a burnisher of hard wood a polished surface, and assumes a very brilliant metallic lustre. The lustre is still further increased if the surface of the wood be first rubbed with a piece of lead, tin, or zinc, and be afterwards polished with a glass or porcelain burnisher. The wood thus assumes the appearance of a true metallic mirror, and is very solid and resistant."

Thomas Storer of Glasgow proposes a new process for the treatment of New Caledonian ores. After being finely ground, the ore is treated in a closed vessel with a solution of ferric chloride at a temperature of 370 degrees Fahrenheit for five to eight hours. The solution of nickel chloride is then run off, any traces of ferrous salt thrown down with chalk, and the nickel recovered in any suitable way. The insoluble ferric oxide is washed, and forms a red pigment. Ores containing 5 to 8 per cent of nickel require about 1700 lbs. of ferric chloride to the ton.

The following process of making blasting and mining fuses has just been patented: A core of nitrocellulose is impregnated with a solution of nitrate and chlorate of potassium containing either prussiate of potash, picrate of potassium or carbonate of potassium, in addition. It is then dried for use. The core may be used direct or may be insulated. As a modification a core is formed of cellulose boiled in a solution of nitrate of potassium, chlorate of potassium and prussiate of potassium, and after being dried it is ready for use.

A plan for constructing an underground pipe, that is not to be subjected to a great pressure, has been employed in France with satisfactory results. A trench is dug and the bottom levelled with cement mortar; an inflated rubber tube covered with canvas is then laid in and cement is poured around and over it. The trench is then filled in and the tube deflated and withdrawn. It is said that 6-inch pipes have been made of hydraulic lime and sand at a cost of 22 cents per yard.

An inventor is endeavoring to perfect a phonographic watch. If he is successful the world will soon see a watch which, by touching a spring, will whisper the time in one's ear.

Scientific Progress.

Liquid Air Intensely Cold.

It is thought that the question of future economy in motive power may be intimately associated with the important discovery of liquefied air. There are so many uses to which it can be put that scientists hardly know where its usefulness will end if it can be produced at a low rate of cost in commercial quantities. Among other advantages, it is claimed that it can be used for illuminating purposes by mixing its escaping gases with atmospheric air in certain definite proportions. Its use in physical experiments has been a most important one in developing the action of intense cold. A most curious phenomenon is shown in the condition of meats at the extremely low temperature derived from the evaporation of liquid air. Mutton becomes so extremely hard that it rings like a piece of porcelain when struck with an iron rod, and can be crushed into a fine dry powder with a hammer, muscle, fat and bone being all mingled together, and as dry as sand.

If a test tube 1½ inches in diameter, having a couple of pounds of mercury in the bottom, is immersed in liquid air, the mercury will be frozen solid in a few seconds, and may be hammered out and manipulated like lead. An alcohol thermometer of large size will be frozen instantly upon being immersed in it, and a tablespoonful poured on about a liquid ounce of whiskey will freeze it at once in flat scales, giving the whole the appearance of cyanide of potassium. It may be emptied out on a table, and will remain frozen in that condition for fully five minutes. A teacupful of liquid air poured on top of a tank of cold water goes into a spheroidal state instantly, in globules of about half the size of ordinary marbles, which fly around on the surface, leaving a trail of white vapor behind them. If any of the liquid be poured on silk, linen or cotton, it will be charred and destroyed just as if it had been put in an oven and browned, though it will make no change in the color.

Professor Linde of Munich has discovered a method of liquifying air which is considered one of the most ingenious methods recently known. It is to be sold by the quart in iron bottles. A quart bottle will do the work of a ten-pound piece of ice. A considerable reduction in cost will be necessary, however, before this commodity will take the place of ice in our refrigerators, and even if it were cheaper there seems to be no way of moderating the cold.

Instead of chilling the air moderately in an ice box, it freezes everything solid; but this will doubtless be overcome in time. In handling the bottles the fingers will be instantly frozen if they are not covered with insulating gloves of rubber. In a few years, it is claimed, the methods may be so perfected that liquid air will be used entirely for refrigeration instead of ice.

THE authorities controlling the electric lighting plant at Geneva are starting a calcium carbide works in order to utilize the idle hours of their plant. The dynamos are driven by water power, of which there is an abundance. Special attention is being paid to the use of good material and the production of the best results. The coke contains but 5 per cent of ash. The lime is very pure, containing 99 to 99.5 per cent of calcium oxide. Each furnace will take 500 H. P. (6000 amperes at 57 volts). They are probably the largest used for the manufacture of calcium carbide. The furnace is a large cylindrical crucible 59 inches in diameter and 32 inches high. The electrode is made of compressed carbon in six pieces, each 60 inches long, 5 2 by 9.2 inches in section. The weight of the six carbons is over 858 lbs., and the total section is 287 square inches. In order to reduce labor charges as much as possible, the pulverizing of the coke, mixing the lime and carbon, and other operations are performed mechanically. From the time the crude material is received until it comes from the furnace but one man's labor is required, most of the operations being automatic.

Total Eclipse of the Sun.

To-day during the space of 120 seconds the sun's light will be extinguished at noon. Mr. Charles Burckhalter, F. R. A. S., and Prof. Campbell of the Lick Observatory represent California in the observers in India. Prof. Burckhalter took a number of instruments especially devised for photographing all parts of the solar corona simultaneously during a total eclipse of the sun. Its duration will be two minutes, the time of occurrence 1 P. M. The eclipse will be total along a tract of land eighty miles in width, across India in a northeast direction from Bombay to Darjeeling.

To view this eclipse the Indian Government and several astronomical societies have arranged to occupy all convenient spots along the line of totality, wherever the railroad system intersects this line. A total eclipse of the sun is a great spectacle. As the dark shadow of the moon steals over the face of the sun the landscape grows dimmer on the horizon with an ashy paleness. The moon sweeps over the entire sun and enshrouds the earth in a pall of darkness. Some of us have, perhaps, stood on a lofty hill and seen far away the green fields stretching beneath us in a wide expanse, and some great river winding its way over the fields like a silver streak; then suddenly a dark cloud swept past the sun, and the coming shadow cast on the ground rushed on over field and river and mountain. So it is with a total eclipse; but the shadow of the moon travels over the earth with a far more impressive velocity, and the ensuing darkness is far more intense. Just before the moment of totality suddenly round the moon, shooting out into the surrounding darkness, appear tongues of fire, often 100,000 miles in length. Their appearance varies in color at different eclipses—sometimes blood red, sometimes rosy pink, and sometimes all the colors of the rainbow. Then comes the corona. Bright ethereal waves of white surround the sun just outside the lurid red, and stretch into the sky a million miles. Around the outer corona sometimes appear white streamers of light, radiating from different parts of the corona and reaching far into space. At the moment of totality the sky is lit up by stars. When the few moments of totality are over the sun appears, the corona vanishes and the red flames of the sun shrink into the disc of the fiery orb.

Cast Steel and Steel Castings.

"Cast steel" is a term that was introduced to distinguish crucible steel from "blister steel" or "weld steel," at the time crucible steel came into use, and once indicated the highest quality. To-day the term means nothing definite, for Bessemer and open-hearth steels, both basic and acid, now are all "cast steels." The term "cast steel" might, by this time, have passed into history were it not due to the practice of many manufacturers of hardware of truthfully stamping the words on inferior articles, and allowing the unsuspecting public to infer that it is the same metal that their great grandfathers thought so highly of. While the "cast steel" of to-day is very likely to be a brittle and worthless material, a good steel casting is quite the opposite. Good steel castings are not only strong, but tough, and have ductility and malleability not much inferior to rolled structural steel. A round rod turned from a steel casting may be tied in a knot, cold; and, after cutting the felloe of a wheel between the spokes, the latter may be twisted up or bent over the hub without a break. Moreover, steel castings may be forged hot or straightened cold.

It is safe to say that any machine or structural casting that can be made in iron can also be as well, or better, made in a steel casting, and with the result that instead of having a weak and brittle object, we have one that is tough, ductile and of as many degrees of strength that may have been decided on beforehand. Steel castings may be safely and economically used in tension as well as compression, which iron castings cannot. Having discovered the general value, utility and economy of steel castings for important work, it will not do to simply order or specify a "steel casting," or we may find that we had better have stuck to iron castings. There have been many so-called steel castings that would bother any metallurgist to classify with any known or recognized product, beyond the fact that they contained nearly 100 per cent of iron; they have lacked many elements that they should have had, and contained to excess many that they should have lacked. To obtain a good steel casting we must have a good specification, and for ordinary and general purposes the following will give good results: Steel castings should be made of acid open-hearth steel, containing not more than .08 of 1 per cent of phosphorus, nor more than .05 of 1 per cent of sulphur. They shall be carefully and uniformly annealed, and test pieces cut from annealed castings shall have a maximum tensile strength of not less than 60,000 pounds to the square inch, and an elongation after fracture of not less than 20 per cent on an original length of 2 inches. Castings shall be true to drawings, smooth, and clean from blow-holes, sponginess and other defects. For important or special work a more elaborate specification should be made, in which the strength may be increased to 90,000 pounds if desirable, the phosphorus and sulphur lowered, and account taken of manganese and silicon, which are important but not dangerous elements in steel castings. It is the general American, but not European, practice to specify elastic limits for structural materials. If this is done for steel castings, the minimum should be placed at 45 per cent of the maximum strength, as owing to lack of work by rolling or forging it will often fall to this point. Acid open-hearth steel has been specified, as it is according to the best practice of the largest steel founders, and for very good reasons. It requires the best of melting stock, and its composition can be accurately calculated beforehand. When the steel is made it can be held in the furnace for a reasonable length of time without change or deterioration, while molds are being placed or changed, which is not the case with basic steel. Welds on steel casting, or in fact in any form of Bessemer open-hearth steel, should be avoided, as they are unreliable.

LORD KELVIN showed in a recent address that all the oxygen in the atmosphere probably came from the action of sunlight on plants. When the earth was a globe of hot liquid it contained no vegetable fuel, and probably no free oxygen. But as it cooled off plants appeared on its surface, and these began to evolve oxygen through the medium of the sunbeams. Upon the oxygen thus derived we depend upon the maintenance of life by breathing. When we burn coal, or other vegetable fuel, we use up oxygen, and it is to plants again that we owe the restoration of the oxygen thus lost to the air. If they failed to keep up a sufficient supply, the atmosphere would gradually part with its oxygen, and the inhabitants of the earth would gradually disappear in consequence of asphyxiation.

A THOROUGHLY good and practical way of blackening aluminum has until recently been unknown. The following, however, is stated to give very good results: Polish the surface to be blackened with fine emery paper, then spread on it a thin film of olive oil, and heat slowly on a spirit flame. After awhile the oil boils and takes a golden color. Then lay on another coat of oil and heat strongly. The golden color becomes brown and soon darkens to an intense black. Let the article cool, wipe off the oil and let dry.

Coast Industrial Notes.

—Asphalt shipped from Santa Barbara Co., Cal., in 1897 amounted to 583 cars, valued at $150,000.

—The sulphur vein recently discovered on the Peak of Orizaba was sold to an American corporation, says *Two Republics*, for $150,000.

—The ranches and live stock of the Detroit Land and Cattle Co. in New Mexico have been sold to Levy Baldwin of Socorro Co., N. M., for $500,000.

—On the San Francisco & San Joaquin Valley road the work of laying track between Hanford and Bakersfield progresses. The road will be completed into Bakersfield March 15th.

—In the State of Jalisco, Mexico, the falls of Juanacatlan, located fifteen miles from the city of Guadajara, which is now supplied with electric lights from this fall, a great source of power exists. Juanacatlan has been called "the Niagara of Mexico." There the River Lerma, which drains Lake Chapala, with a width of over 200 feet, makes a leap of 60 feet. The cotton mills of Tialpan, a suburb of the City of Mexico, are now being moved to these falls. In the northeastern part of the State of Pueblo a whole river make a leap of 997 feet. Near the station of Rascon, on the Tampico branch of the Mexican Central railroad, is the Abra de Caballos, where another river falls in a series of cascades some 300 feet, and in various parts of Mexico, from the State of Chiapas, in the south, to the northern States, there are similar falls, where valuable powers exist. The conformation of Mexico is favorable for the creation of water powers, as the largest part of the country is an elevated tableland, which acts as a large roof, and on all the slopes where the water falls down to the lowlands there are valuable water powers.

—Pres. Robinson of the Mexican Central R. R. says: "Mexico is now prosperous to an unprecedented degree; in fact, the country could not well stand greater prosperity. The Mexican Central R. R. naturally shares in this prosperity. The gross earnings for the year ending Dec. 31st will show a large increase over the preceding year; the deficit after charges will be slightly reduced from our previous estimate of $700,000. During the past year $1,500,000 has been expended, principally for additional rolling stock, to take care of the great volume of traffic offering the road. Forty-six locomotives have been purchased and are now on the ground. The company is now receiving about 46 cents for its silver dollars. We never speculate in them, as they are sold as soon as we receive them. The prospects for 1898 are very good; they are even better than were the indications a year ago for 1897. We have not yet heard from the Mexican Government relative to a reclassification of tariffs, but we expect to hear from them very soon. Their favorable action, which is expected, will be of material benefit to Mexican railroads."

—Commercial missions must bring large results to nations who take intelligent methods to ascertain the needs of the world's markets and adjust their manufactures to the demands of distant peoples. The associated chambers of commerce of England sent out an expedition which submitted to its promoters matters of interest which may prove to be of the greatest importance to English trade. In order that the United States may enlarge foreign trade, it is of the first importance that our manufacturers should know not only what suits American tastes and prejudices, but what other people like and will have, and how to prepare and deliver such goods. The establishment of a commercial museum in Philadelphia and the projecting of another in San Francisco is the first organized effort of the United States business men to supply needful information and illustration of the world's products and demands. One of the most valuable uses of such museums is the exhibition of samples of the kinds of goods used in foreign lands and illustrations of the methods of preparing and putting up such goods as command the favor of the purchasers. This is particularly true in China. It has not unfrequently occurred that the sale of foreign goods has been greatly crippled by having some label placed upon it that was offensive to the Chinese superstition or tastes. Many colors have peculiar recognition by the people; some offend their tastes and others their superstitions. Some are all right on some kinds of goods and all wrong on others. Simply naming these things will not supply sufficient data from which to prepare them. It must be remembered that Chinese art is very peculiar, and a tiger, as ordinarily represented by foreign artists, would not meet with favor with these people. It must be a tiger according to Chinese imagination and art, of unreasonable length of body or bigness of head or curve of tail, and impossible attitudes. On a popular Japanese match box is displayed a monkey standing on its front feet, head nearly touching the ground, with hind feet up in the air, and tail whipping the skies. The grotesque and even hideous, to the American mind, tickles the fancy of the dwellers in Far Cathay. No description can supply adequate information to an engraver or colorer by which he could produce the real thing, and any departure from the Chinese fancy in such things would brand the goods at once as the product of a "foreign devil" and doom it to defeat.

THE sanitary district of Chicago has awarded a contract for an eight-track swing bridge over the drainage canal at Campbell avenue, to cost $320,000. This swing bridge carries the tracks of the P., C. C. & St. Louis, C. & N. P. and Union Stock Yards & Transit Company. The length of the bridge is 316 feet, width 112 feet, and weight of steel 40,000 tons. This is the largest swing bridge in the world, the next largest being that over the Harlem river, on the New York Central road line.

Mining Summary.

CALIFORNIA.

Alpine.

The mines near Woodfords are to be reopened.

Amador.

Dispatch: Sinking in the Pocahontas at Drytown progresses. A drift is being run to connect the Pocahontas, Edson and California.

The Wildman-Mahoney at Sutter Creek is sinking the new three-compartment shaft at the rate of 100 feet per month.

At the Klondike mine near Slabtown surface ore assays $13 in free gold; at the water level it assays $45.

Record: The shaft at the Oneida has reached 1450 feet. At 1500 feet drifting to the ledge will be commenced. Sinking will not be discontinued when drifting is begun.

The *Record* says that the ledge on the Benoist property is 50 feet thick and averages enough to justify the erection of a mill.

Butte.

(Special Correspondence).—The Butte Co. Electric L. & Power Co. has obtained a franchise and is erecting its lines. The capital stock is $150,000, all subscribed. The officers of the Co. are Robt. A. Friedrichs, O. T. Webber, S. J. Hendy and R. White.

Chico, Jan. 18th, '98.

P. Riordan is building a 5-stamp mill on his mine near Enterprise.

D. Jacocs sold to J. M. McClung and C. A. Brazelton one-third of the Mammoth and Monumental at Forbestown.

The American Gravel M. Co. of San Francisco is opening a claim opposite Centerville.

Capt. Thos. Couch and Frank Southerland have launched their dredger on Feather river, seven miles northeast of Biggs, and the machinery is being placed. The dredge is expected to handle 2000 cubic yards per day at a cost of 3 cents per cubic yard. The ground is said to pay from 15 to 40 cents per yard throughout the tract of 1200 acres.

Calaveras.

Operations on the May Day are in progress. C. Y. De Lay is Supt.

At the El Encino, at Junction, the old incline has been cleaned to a depth of 70 feet. J. Regan is Supt.

The Dry Creek M. Co. began suit against the California.

The Spanish Bar placer mine, above Esperanza, is to be operated by an hydraulic elevator.

A tunnel is being run on the Wickham property which was bonded some time ago by a Scotch company.

J. N. Burns started work on the Oriental mine.

The Farrington G. M. Co. is working on the Beeler property.

Demarest & Co's. mine and 5-stamp mill, on Cherokee creek, are in operation.

H. & O. Beauchemin ground three tons of rock last week which paid $50 per ton.

Six tons of ore from the Mitterbauer property yielded $310.

Good rock is being taken out at the Blizzard.

The company that bonded the Herbert ranch is sinking a shaft to tap the ledge. It has reached 60 feet.

Echo: Operations have ceased at the Calaveras Con. mine, at Robinson's Ferry, the tracks taken out, and the machinery moved.

There are employed in this district, says the *Echo*, 451 stamps, numerous arrastras, seven chlorination furnaces, and one cyanide plant.

The Blair mine, on Smith Flat, started last week.

Del Norte.

The work of clearing the tunnels on the Union copper claim at Low Divide is advancing, so that Kemp, the Iron Mountain Co.'s representative, is enabled to examine the ledge and make his report.

El Dorado.

(Special Correspondence).—The Montauk M. Co. are making several notable improvements in their electric and hoisting plant. The mill is running on fair grade ore from the 600 and 700 levels.

The Try Again hydraulic mine, a new venture, is ready to begin operations as soon as the weather modifies and water can be had.

It is current news here that work is soon to be started on the Columbus mine, an old-time property of good record.

J. B Polk has brought suit in partition of the Gold Note and Philadelphia mines against the Septimus Development Co. and Parker Bros. The property is situated at Omo Ranch P. O., twenty-seven miles east of here.

The Boulder M. Co. has secured daily mail service and changed its postoffice from Rescue to Shingle Springs.

Placerville, Jan. 18, '98.

Beilick & Gray have exposed a ledge of good rock near Fairplay.

A. Herrill is taking out good rock at his Inaugural mine, near Coloma.

In the Pittsburg, fifteen miles above Placerville, the tunnel is 400 feet.

Nugget: The upper tunnel in the Skinner mine, adjoining town, is 80 feet to the vein, and 300 feet on the vein. The lower crosscut tunnel is 225 feet to the vein, 57 feet on the vein and 40 feet across, with no footwall in sight. There are thirteen tons at the mill awaiting crushing. The mine has produced $10,000 since Dec. 15.

Kern.

The Wedge mine, at Randsburg, is being developed with encouraging results. From a recent millrun nearly $5000 was obtained from forty tons of ore.

Valuable copper discoveries are said to have been made near Granite Wells, twenty-six miles east of Randsburg.

One hundred men are employed in the Yellow Aster Co.'s mines.

Ore was discovered in the W. J. Bryan mine last week, 16 to 18 inches in width, said to be high-grade.

The company that built the railroad to Kramer have let a contract for the building of a 50-stamp mill at Barstow.

Fire destroyed thirty buildings in Randsburg last Wednesday. The loss reaches $50,000, with little, if any, insurance.

The *Miner* is informed that the Yellow Aster M. Co. will soon put in four gasoline hoists.

Lassen.

(Special Correspondence).—The mines of Hayden Hill are on a stable basis. The Golden Eagle after a successful summer's run is closed down for the winter. A cyanide plant for the treatment of tailings, which was added to the mine's equipment last spring has proved a success.

The Hayseed shaft is being sunk to the 280 level, and other operations are for the present suspended. The mine promises to become one of the best in the camp; the ore averages about $20 per ton.

The Hayden Hill Con. M. Co., a corporation of local mining men, is driving a tunnel into the hill from the southeast. They are now in about 1900 feet and the work is being pushed ahead.

Mariposa.

(Special Correspondence).—S. B. Terrill, of San Jose, who has recently purchased the Geary claim, near the Tendron mine, at Whitlocks, is erecting a 4-stamp mill on the property.

The California Exploration Co. has taken over the two claims belonging to Mark Parker and A. Shimer, adjoining the Virginia mine on the southeast. These claims cover 3000 feet of the lode and the price is in the neighborhood of $10,000.

A number of Fresno parties are negotiating for a bond on a group of six or seven claims belonging to Thos. M. Carroll, located near the Crown Lead properties between Coulterville and the Merced river.

M. J. Heller, representing J. W. Mackay and others, has secured an option on Marble Springs property, on the North Fork of Merced river, from Miner Hilliard and H. Hedges. The consideration is not stated.

Sinking of the three-compartment shaft is in progress at the Mary Harrison. About forty men will be employed in the development work on the mine.

Surveys are in progress for a wagon road from Coulterville to the Sierra R. R., near Chinese Camp. The new road will follow closely the mother lode, past the Penon Blanco and Moccasin creek, and will be about ten miles shorter and much easier than the route via Priests. The cost will be defrayed by private subscription.

Mariposa, Jan. 17th, '98.

The Geary mine, on Whitlocks, was recently purchased by Terrill & Schroeder who are developing the property and erecting a mill.

The Boston News Bureau, under date of Jan. 8th, publishes what is apparently an authorized statement by the Merced management of the condition and plans of the company. Briefly it is that the mine for the past six months has been producing from $10,000 to $15,000 monthly, which has netted a small profit each month and paid for the development work; that the ore has yielded "over $7 per ton" and costs a little less than $6 to mine and mill, an apparent profit of $1 per ton which can be increased to $3 if the ore can be treated "in bulk" whatever that may mean. That certain interested parties will now lend the company $60,000 for development and if 120,000 or more tons of pay ore can be blocked out in addition to 60,000 tons said to be already in sight an assessment will be levied and the mill facilities enlarged with the aim or earning a dividend of $3 per share.

While the statement as a whole agrees pretty closely with the known facts, as they are understood locally, parts of it are liable to be misleading. It will be a surprise to learn that the monthly output is so low as $10,000 to $15,000. It has been generally believed to be much higher, especially for the past ninety days, but no definite figures are obtainable as the company ships only part of its bullion by express, the remainder going by private messenger and leaving no record. No account seems to have been taken of the rich streak of rock which is known to exist in the Mary Harrison mine, although it was very much in evidence at the recent preliminary examination of the miners charged with ore stealing. The manager then testified that the ore in the streak stolen on which the two men had been kept at work was worth about $10,000 per ton, and several sacks of the rock now in custody of the sheriff as evidence appear to substantiate the statement. The local manager armed with search warrants is still searching miners' houses for more of the ore, and it seems unlikely he would do this for such amount of $7 rock as the men might carry away in their dinner pails. The ore on the 600 level is known to show considerable gold when broken, and looks to be better than the figure stated. If the mill, which has been crushing fully 100 tons per day, has saved $6 per ton and the men working on the specimen streak have sent down even a fraction of a ton per month, it would seem that the output is understated.

The statement that the mine has paid for all development work is literally true but loses some of its force when it is recalled that no development work has been done, the local management not even being allowed to sink the shaft below the 400 level while stoping on the 600. The estimate of $500,000 in machinery, shafts, etc., on the mines now closed is probably an error. Exclusive of the Mary Harrison mine all the improvements on the property will hardly foot up half that sum. In the course of recent land office proceedings affidavits of the value of most of these improvements have been filed in San Francisco by officials of the company. These set the value of the 1000-foot Malvina shaft, buildings and machinery at slightly less than $42,000 and all other mining improvements on the west vein at $8000. It is probable that the workings on the Malvina vein amounting to some 3000 feet of crosscuts and drifts and a 400-foot winze were omitted from this statement, but for these $40,000 should be a liberal figure. The 40-stamp mill in the same showing is set down at $65,000, which is about double the ruling cost of similar plants in the State.

The only other work of consequence on the abandoned mines was the Nelson shaft on the Louisa mine, which was sunk 300 feet, with a winze about 300 feet deeper, and something like 1500 feet of drifts and crosscuts, for which $55,000 would be a liberal estimate. The company's other improvements and their approximate cost are: Storage reservoir, $15,000; tramway, $10,000; machine shops, assay office, etc., $15,000; this makes a total of $250,000, of which about one-half is based on sworn statements from the company's office. Any one familiar with California prices can slightly vary the figures perhaps; they only purport to be approximations.

The stockholders have paid in $12 per share on 100,000 shares, of which $300,000 is understood to represent the purchase price, the balance of $900,000 (increased by at least $100,000, which is known to have been taken out in the mill), has all gone into the property, except $20,000 reported as in the treasury since the mine became self-sustaining.

The dividend of $3 per share, which the News Bureau contemplates would thus be equivalent to 25 per cent per annum to the stockholders as they stand to-day, or to 20 per cent as they will stand if the balance of $3 per share shall be called in. This would certainly be a handsome return on the investment, but the suggestion of so high a rate of dividend savors of the kiting which sent the stock up to $40 two years ago before a mill was placed on the property. There are 100,000 shares; therefore, to earn a $3 dividend there must be net earnings of $300,000, and, even if the ore is "handled and milled in bulk" at a profit of $3 per share as outlined, there would have to be milled 100,000 tons per annum, or 8333 per month. The best that the 40-stamp mill can be expected to do is 2700 tons per month, so the milling capacity would require to be trebled at least.

Unless new and large shoots of ore can be uncovered it is preposterous to expect the Mary Harrison mine to sustain a 120-stamp mill, and there is little prospect of the mines once opened, and now abandoned, lending much aid to swell the dividend roll. The test run of the Louisa ore netted something under $2, if we recollect rightly, and the 5868 tons milled, principally from the Malvina, in March, April and May, '96, averaged, according to published statements, $2.63 per ton in gold and 62% in sulphurets.

The policy of the company in borrowing $60,000 from some insiders at a time when there was yet $300,000 due on stock, and subject to call, has been questioned. If, as the News Bureau says, the mine "is largely owned by its managers and directors," it may seem immaterial whether these latter furnish the money as a loan or as an assessment on their stock. In case, however, the property should fail to realize expectations, the difference in position between judgment creditors and stockholders would become material, and the loan would savor less of philanthropy.

We have no disposition to decry this property; it has suffered enough; its record is history now. A million and a quarter dollars have gone into the property, one claim out of thirteen has been proven valuable, but the improvements which the company has placed on that, together with the mill, reservoir, tramway and shops could be duplicated for $150,000. Most of the rest of the vast sum is gone. The Mary has made a plucky up-hill fight and has won it by demonstrating that she can yet pay her way and more. With reasonable capitalization and efficient management she will have as bright promise as any mine in the State of California. It is unjust to saddle her with the million dollars which was squandered on the property. It is unfair to stockholders to lead them to expect that they may receive 25 per cent dividends on this wasted money.

These are the things we deprecate, especially at a time when every scribbler seems to think he has license to attack California mines and mining investments. Our mines are all right if managements will give them a show.

Nevada.

(Special Correspondence).—The Mud Springs and Lily mills have temporarily shut down for the want of sufficient water. Both these mills depend upon water from their shafts to supply their engines and batteries; owing to the failure of rains the supply of water is now extremely low. Both of these mines have ample supply of ore in sight.

Ellis & Thrower are developing the Glen mine near O'Neals. This vein has heretofore furnished good ore.

W. R. DeFrees is reopening the old Reub Williams mine, at Hildreth.

At the Live Yankee, near Graniteville, an encouraging gravel deposit has been encountered in the main tunnel.

Telegrayh: Lauctot & Barnett on the Monitor have a 6-foot vein which has been traced on the surface for 3000 feet. The ore prospects well.

Union: The Manzanita mine, at Sweetland has a permit to hydraulic. The company will begin work so soon as the water season opens.

Transcript: At the Cadmus the mill is running on ore from the 320 level. On the 500 a crosscut is being run to tap the ledge.

At the Home the shaft is 400 feet on the ledge.

Union: I. Haas has purchased a third interest in the Alta-California placer mine.

Supt. Buffington reports progress at the Kirkham mine. The new mill has commenced crushing. The prospects are encouraging.

J. R. Ritchie moved his mill from Maybert to Omega to prospect the Celia quartz mine.

Union: It is reported that a new chute of ore has been struck at the Gaston Ridge mine.

Tidings: The Eagle Bird, at Maybert, will be opened for work next month. Good ore is being taken out. Good ore is taken from the Round Mountain mine, a mile from Navada City. This is a new section. The Mistletoe, near Rough and Ready, will be opened by Grass Valley and Nevada City men.

Placer.

The Jupiter Con. G. M. Co. was organized in Auburn Jan. 8th, to operate the Winchester and Jupiter gravel mines on the Iowa Hill divide.

W. Rablin, of Dutch Flat, has started work on the tailings of the Alta.

H. Sangmaster is working in his claim at Shady Run.

The statement of the Pioneer M. Co. for December is as follows: Tons rock crushed, 780; value gold bars, $11,461; payroll, $4103; bills, $1518; total expenses, $5621; net earnings, $5839; average value rock, $14.70; men employed, 49.

Plumas.

Bulletin: D. M. Butterfield has taken ten nuggets from his mine, one of which weighed $41 and another $140.

San Bernardino.

A sale is reported, twelve miles from the Needles, of a group of six mines by Seburn & Shafer for $50,000 to Missouri capitalists, who will put on machinery.

San Diego.

One-half interest in the California mine in Defiance district has been sold to W. S. Clark for $1000.

Shasta.

(Special Correspondence).—Development on the Mt. Shasta property, four miles from Shasta, is progressing. Work on the surface cuts and tunnel has produced sufficient good ore to reimburse the purchasers, who are said to have paid $8000 for the property.

At Muletown, near Shasta, a prospector is taking out ore that nets him $380 per ton. This district is producing some good properties. The ore is mostly a smelting proposition, but all of it yields good values.

Work on the Dry Creek Slide, owned by McCarthy & Co., is moving rapidly. The property comprises five claims and is about one-half mile above the smelter. The tunnel is over 400 feet on a 4-foot vein of medium grade. There will be rail connection with the Mountain Copper Co. smelter, to which they will furnish thirty tons per day.

Shasta, Jan. 17th, '98.

Press: W. Z. Turney has a ledge near Clover assaying $18 per ton.

The Three Sisters mine, near French Gulch, is bonded for $20,000 for nine months to Howell & Motherwell.

F. Hurst is developing the Colorado mine, near Whiskytown, which he recently purchased from G. Lyman.

E. P. Connor of Middle Creek, in his Corrinne location, crosscut the ledge at 130 feet, drifted 62 feet, made an upraise of 60 feet, in ore all the way, that will mill $30 a ton.

At the Afterthought smelter on North Cow creek, from 1000 tons of roasted ore, sixty tons of high-grade matte was obtained. The smelter closed down January 4th for a short time pending the settlement of the estate of J. Enright.

Searchlight: Assays of the tailings at the Niagara mine run from $5 to $7 per ton. Investigations show it would be profitable to treat them by the cyanide process. The dump contains 3000 tons.

The Milkmaid mine at French Gulch, under the supervision of D. B. Hunt, is doing well.

LaDue & Adams, on Portuguese Flat, are drifting into good pay gravel.

The Kotzebue C. & M. Co. of Redding, formed to carry on mining business in the Kotzebue sound country, Alaska, decided to purchase the Andrew Hicks sailing vessel. The intention is to start in April.

Sierra.

(Special Correspondence).—Ed. Brown has bonded the Kennet mine, comprising two claims, with an 18-stamp mill, to Los Angeles parties. The property is two miles below Alleghany.

Siskiyou.

The Aromas Co. began work near Sawyer's Bar. A hydraulic elevator will be worked in addition to giants.

Good quartz has been found in the Mexican mine on the South Fork.

The Schroeder mine shows richer ore on the 1200-foot level than at any place above.

The new company, which bonded the river bottom along Scott river, between Etna and Callahan, started prospect work last week.

Work is progressing at the Salmon River Hydraulic M. & D. Co. About 6000 feet of ditch is completed, also 1150 feet of flume, with two miles of flume and a mile and a half of ditch to build. Two giants will be in operation.

The Distlehorst dredger is still at work in the Klamath river.

The Manaha mine, on Salmon river, has begun operations under the supervision of W. C. Stanly.

Trinity.

P. Larcine is opening a body of cinnabar ore at New River.

The Integral Co. is developing its property at Cinnabar.

At the Highland mine, Taylor's Flat, piping is carried on three hours a day. As soon as the water comes the mine will be worked night and day. G. Pelletreau is Supt.

Tuolumne.

Sinking on the vein of the Arbona, at Tuttletown, was resumed last week at a depth of 180 feet. The shaft will sunk 1000 feet.

A mill will be erected on the Sell mine, in Sonora.

Yuba.

A few men are at work in the Pennsylvania mine, Brown's Valley.

The *Appeal* says that the Good Title Co.

is adding five more stamps to its mill, making fifteen in all. T. J. Carson is Mgr.

NEVADA.

At Tuscarora the Dexter is erecting a mill and putting in an electric power plant. The cost will be $100,000. They employ 125 men and pay $3 per day.

J. Smith has secured a bond on the old Wilson mine at Pine Grove. Future operations will involve an outlay of $75,000. The tailings dump amounts to about 25,000 tons and is valued at $9 per ton. This will be handled at the rate of fifty tons a day, while the mine itself will be worked steadily. The ore averages $25 per ton.

At the Golden Eagle M. Co.'s property in Humboldt county the vein recently encountered shows an average of $54 in gold. The vein is 6 feet wide. C. Wilbur is the Gen. Mgr.

At DeLamar the output is averaging 300 tons a day.

The ledge in the Mountain View is 4 feet wide and shows native and horn silver.

The tunnel on the Zip Coon and Gold Eagle at De Lamar has cut a promising 4 foot ledge.

The ore in the Star's lowest workings at Ely is from 6 to 7 feet wide.

Gaby & Buntin at Osceola have uncovered a good vein on the Exchange mine.

OREGON.

At the Abbott mine, near Grants Pass, a tunnel has been run 70 feet on the lode, which is 2 feet wide, in free milling ore ranging from $50 to $75 per ton. There are twenty-five tons of ore on the dump.

The Oak Flat Hydraulic M. Co. has two giants in operation.

A. Lemke has a 5-foot vein of high-grade ore which has the appearance of copper sulphides. The mine has 1200 feet of tunnels.

Two No. 1 giants and 1400 feet of pipe are being placed on the Powell creek property, near Grants Pass. E. M. Corbus is Supt.

Supt. W. O. Reynolds of the French-Flagstaff M. Co., Baker City, is adding machinery for the cyanide process.

The Timber Canyon mine near Sparta has a vein 4 feet in quartz porphyry. Development work is progressing. There are nine claims in the group. If the mine meets expectations it will be ready in the spring for a 20-stamp mill.

The Flagstaff near Baker City has ceased work for six weeks, until the cyanide process is in place.

WASHINGTON.

The New Year at Colville has reached 30 feet on 4 feet of ore that will run forty-four per cent lead and fourteen ounces silver.

The German American Co. on the Colville reservation has finished a tunnel which taps the ledge at 230 feet depth, and another contract for 100 feet has been let. The ledge is 60 feet wide.

BRITISH COLUMBIA.

(Special Correspondence). — Several members of the Golden Cache Co. at Lillooet have put in an application for 5000 shares of treasury stock at $1 per share for the purpose of continuing work on the mine and ascertaining to a greater extent the continuity of the vein. In the open market the stock is selling at 50 cents, having dropped to that figure from $1.80 as a result of thirty days' run of the Golden Cache mill, which proved 750 tons of ore to contain an average of $4.40 per ton in gold.

Vancouver.

The Snowshoe at Greenwood has been bonded for $65,000, payable 10 per cent April 1, 10 per cent July 1, 40 per cent October 1, and balance on January 1, 1899. There is a shaft 70 feet on the footwall, from which good ore is obtained.

With an increased water supply the Tinhorn mine at Fairview will mill forty tons per day, instead of four tons, as heretofore.

The Fern, near Nelson, returns a net profit of $16,500 for three months from a 10-stamp mill.

The Channe M. Co. have decided to reduce the amount of capitalization from $1,000,000 to $250,000.

The London & British Columbia G. F., at its recent annual meeting, reported the profits of the Ruth £31,941.

The *Spokesman-Review* reports the Wallingford group in Rossland sold to an English company for $75,000.

Mr. A. S. Hallidie of San Francisco is this week in receipt of several specimens of ore from Quatsino sound, in the extreme northern part of Vancouver island, which illustrates the remarkable mineral wealth of that region, which is as yet almost wholly undeveloped. The specimens show gold, copper and other metals, and indicate a profitable field for active work.

The Chieftain of Cariboo has been bonded by Burns & McKenzie for $65,000. The Southern Chief of Slocan has been sold for $2500. The Iron Mountain group, near Christina lake, has been bonded to Hobbs, Jeffrey & Co. for $50,000. The property is equipped with a 10-stamp mill. The Relief, near Creightown, is under bond for $30,000. There are 400 tons of ore on the dump.

The British America Corporation of London, which had the Alaska Commercial Co., the Le Roi mine and other ictas—in its prospectus—seems to have miscalculated all round. Now the deal for the Le Roi is off, W. D. Turner, president of the Le Roi M. & S. Co., says: "I never thought for a moment that a sale would be consummated to that company. To my mind it looked much as if the people who drew that prospectus used the name of the Le Roi mine to attract the attention of the English investing public. They never had the right to use the name of the mine in any way, but their prospectus was cleverly worded. In this country, however, such actions would be termed obtaining money under false pretenses. The mine is in good condition and has a large daily output. It was the intention to start up the smelter this morning, but owing to a delay in securing coke the opening has been postponed."

THE KLONDIKE.

Dawson City residents state that they have received no mail since July and August, and they know nothing of what has happened in the outside world since late in September.

The begira of '98 has begun; the steamship Walla Walla sailed from San Francisco last Sunday with 360 passengers for the Klondike.

SIBERIA.

There are now about 40,000 miners at work in the gold mines of eastern and southern Siberia. The grains of Siberian gold are said to be on an average larger than those of any other part of the world. All efforts to obtain anything like correct information regarding the output of gold in Siberia have so far proved unavailing. No one outside of a few Russian officials is permitted to know.

IDAHO.

The report recently sent out that the Iowa mine in Boise basin had been sold for $75,000 is denied. A 10-stamp mill is running steadily on part of the product but the ore is base. The cyanide process will be introduced.

The Poorman at Burke has been closed indefinitely and over 100 men are thrown out of employment.

Adjoining it is the Hope mine, on which work is progressing under bond.

At the Camas No. 2 the cyanide plant will be started as soon as the weather permits.

At the Tip Top they are taking out ore that yields $30 gold in addition to considerable copper.

Work has been resumed on the tunnel of the Kootenai M. Co. on Mica peak, at Cœur d'Alene. It is in the ledge 175 feet, and shows a body of ore which assays from $10 to $25.

The mineral product for '97, as estimated by the Government assay office in Boise, is: Gold, $2,500,000; silver, 5,500,000 ounces: lead, 100,000,000 pounds. Computing the silver at the coining value, and lead at 3½ cents, gives the following figures:

Gold	$2,500 000
Silver	7,100,000
Lead	3.510,000
Total	$13,110,000
Production in 1896	11,762,845

UTAH.

The Sacramento at Mercur is treating 100 tons of oxidized ore daily.

A company has been organized to operate the Granite Mountain group at Mercur. They begin sinking at once and work will be continuously prosecuted.

A carload of ore from the Utah at Fish Springs was marketed last week yielding 100 ounces silver and 35 per cent lead.

G. H. Townsend has inaugurated work on his property at Deep creek.

Promising copper mines have been discovered near Vernal. There are two veins, one 3½ feet deep which assays 47 per cent copper at a depth of 50 feet, and another 6 feet, which returns 17½ per cent copper.

At Mammoth the Sioux-Ajax tunnel is in about 3000 feet. The connection of the tunnel with the Sioux ore bodies promises to make a very heavy producer of that property.

The Mercur mine at Mercur is turning out 300 tons a day.

The *Tribune* says that the consent of the railways to a reclassification of cyanide of potassium means a saving to the Mercur camp alone of $10,000 a year.

Six cars of crude ore were shipped last week from the Horn Silver mine.

Late advices from Silver City state that the Sunbeam made a strike showing 40 ounces silver, 30 per cent lead and 15 per cent copper.

SOUTH DAKOTA.

H. Schenk has sold the North Star group, near Custer, for $15,000.

The shaft of the Chicago and Two-Bit Co. has reached 110 feet.

MONTANA.

Montana's mineral production last year reached nearly $53,000,000, an increase of $2,000,000 over 1896.

W. G. Galigher is shipping ore from the Tilden mine, near Argenta.

Ormsly & Leash made a five-ton shipment of galena ore from the Buckeye No. 1 at Sheridan.

Three hundred sacks of ore were shipped from the Fisher mine, near Sheridan.

L. D. Porter has bonded five claims near Junction. A carload of ore from this mine averaged $50 per ton.

Planlapp Bros. shipped 500 sacks of high grade ore from Nobleville.

The Butte *Miner* presents the following figures showing the production of copper in pounds fine for Montana from 1882 to 1897:

1882	9,058,284	1891	112,359,320
1883	24,698,345	1892	161,051,477
1884	43 098,951	1893	154.3 0. 00
1885	67,707,861	1894	183.494 755
1886	57,611.621	1895	194 788,925
1887	78,699.677	1896	228,958,184
1888	97,8 7,0 8	1897(estimated)	2 0,00.0,000
1889	98,222,444		
1890	110,955,733	Total	1,872,571,629

Taking copper at an average value of 11 cents, the total value of copper alone taken from Butte is $200,000,000.

The largest mining shaft in Montana is on the West Colusa property of the Boston & Montana Co. in Butte. It is a three-compartment shaft with end pieces 9 feet in the clear, and wall plates 16 feet 8 inches in the clear. The shaft is being sunk from the 800 to the 1500-foot level. Mules are to be introduced in the mine for hauling ore to the shaft in long distance levels.

The Livingston Union Coal Co., four miles west of Livingston, is turning out fifty tons of coal daily. The management has put on an additional force and will increase the output to seventy-five tons daily.

ONTARIO.

(Special Correspondence.)—The Golden Star M. & Ex. Co. of Ontario are working thirty-five men. Depth of shaft 159 feet, length of drifts at 75-foot level, north 105 feet, from which point a winze, to connect with the 150 foot level, is now 40 feet, south drift 80 feet. Average width of vein 4 feet, average value $14 72. 82 per cent free, silver from $1 to $2; 1200 tons of ore on dump.

Bonheur mine, in Saw Bill district, depth 210 feet, stoping from 60 and 120-foot levels, ten stamps and two plain belt vanners and one corrugated belt vanner. Monthly output about $6000.

Olive mine, depth 110 feet, 2-stamp prospecting mill, output from 176 tons, $7,852 50.

Duluth, Minn., Jan. 10th, '98

At the Caldwell mine, Rat Portage, eighty tons are crushed daily and the value of the ore is said to be $15 to $20 per ton. The shaft is down 400 feet, and a 30-stamp mill is in operation.

The Mikado, in the Rat Portage country, is producing $20,000 to $25,000 a month.

At the Regina, Lake of the Woods, the main shaft is 385 feet. The ore increases in quantity and value with depth. There is a 20-stamp mill in operation.

The Little American, at Rainy Lake City, has struck ore on the 210-foot level that mills $30.

COLORADO.

The Nightingale resumed shipments with three cars of ore. One car will average one ounce, and two cars were of two-ounce ore.

The May Belle, at Lawrence, has been leased to an Eastern company for eighteen months, which will at once resume operations.

The Pharmacist received returns on a portion of last week's shipments, showing a decided gain over shipments marketed for some time. Three tons brought $598 a ton, and nineteen tons $98 60 a ton.

An entire train load of mineral, of an estimated value of $100 a ton, was sent out last week from the Emma No. 2, at Cripple Creek—the result of a week's work.

Keith & Co. recently made a 10-ton shipment of two-ounce ore from the Homestake.

Production on the Dickerman the past week averaged above forty tons a day, and the ground opened will permit this output for several months.

The Colorado King, Cripple Creek, is sinking its shaft for a second level. The ore body holds out under all development done, and is good for weekly shipments of about two-ounce grade.

Work has started on the Surprise, at Yankee Hill. This property was recently sold to Colorado Springs parties for $15,000.

The Ivenness, in Clear Creek county, has found pay-streak at a depth of 52 feet. The vein is 5 feet wide.

The tunnel on the Chamberlain will cut the new find, in 1800 feet, at nearly 1000 feet depth.

At Yankee Hill B. Warner has secured a bond on the Eureka. It has a vein of sulphide ore 15 feet wide, averaging $20 per ton.

The Wire Go'd Group, at Yankee Hill, has been bonded to a New York company for $50,000, half of which was paid in cash.

The Whale mine, in Clear Creek county, has been bonded to Thrall & Co. The shaft is in 50 feet on a good vein. The Louisa has been bonded to Bell & Co. Both properties are to be developed.

The mill at Yankee Hill is completed on the Alice placer. The mine is owned by Crocker of San Francisco and is managed by Taylor. The vein is a dyke, 400 feet wide. The mineral across this entire deposit runs $10 in gold.

The A. Y., at Leadville, has been started by J. R. Newton & Co.

After eighteen months' cessation, the Rex shaft at Leadville will resume operations. It is understood that C. M. Priddy, T. S. Woods, C. Boetcher and Baer Bros. are leading spirits in the enterprise.

A drift has been extended 140 feet on the 350 level of the Garbutt, at Leadville, which shows well in copper sulphides.

At the Thespian mine, Leadville, a drift is being run on the contact between the porphyry and lime which has reached 160 feet.

The returns from the last Ridgway shipment, at Silverton, were $1800.

Froch Bros. & Heck, of Victor, disposed of their Gold Star lode to J. Ellis & Co. for $30,000.

W. E. Waybright has control of the Atlas property, Lake City, and will at once develop it.

R. Taylor, of the Sherman mine, near Lake City, struck ore that will run 175 ounces copper.

Mineral county in 1897 produced $217,000 in gold, a gain of $164,117 over 1896.

The Weir, at Cripple Creek, at 75 feet has a 2½-foot vein of talc, running four ounces in gold.

The Colorado G. M. Co., operating near the town of Gillett, has installed an air drill and compressor. The breast of the bore is in 300 feet and will be driven another 200 feet before any drifting is done.

One hundred and twenty tons, of an average value of $75, were shipped from the Abe Lincoln last week.

On the Granite Hill a new body of pay ore has been encountered at a depth of 180 feet.

A. Edwards is taking out copper, iron and honeycomb quartz on the Queen Blanche, near Boulder; the average assay is $15 in gold.

The Vindicator, at Cripple Creek, is running forty tons daily.

D. H. Weaver is driving a tunnel on the Blue Cut, near Boulder; the quartz assay is $12 per ton.

The Independent mine, at Saguache, is cleaning up $1400 a week.

Hazzard & Brown, near Saguache, have a 5-foot vein assaying $30 per ton.

On the Big Six, at Leadville, the vein recently discovered opened out to 6 feet and is rich in iron carbonate containing a small percentage of lead plentifully covered with native silver.

Ten tons per day is being shipped from the Waldorf shaft, of the Black Prince porperty, at Leadville. The ore carries silver, gold, lead and iron.

The Boston & Trinidad G. S. & R. Co. has been incorporated, to operate the smelting and reduction works at Trinidad, general offices in Denver. Capital stock is $1,000,000. H. L. Prentice, R. C. Roy and E. P. Smith are the directors. The smelter which the company is to run has been in course of construction for two years past and is just completed.

The Portland, near Gladstone, made a new find, averaging 4 feet, giving returns of 9 ounces silver, 52 per cent lead and 14 per cent copper.

The Mollie Gibson and Argentum at Aspen are about to erect a concentrating plant of 700 tons daily capacity.

Large shipments of manganese iron continue from the Catalpa and Crescent mines at Leadville.

The Dollie B. shipped four wagon loads of mineral, the first shipment made by this mine.

The Ingham at Cripple Creek is shipping fifteen tons a day, the ore averaging $30. The Jack G. was bought by the Ingham on a bond for $35,000; proceeds of the royalties paid for the property in sixty days.

Rountree & O'Brien of the Deadwood at Cripple Creek made a 15-ton shipment of $90 ore last week. Goldfield mines produced 350 tons of ore a day during the past month. The Crawford at Cripple Creek shipped four carloads last week of $80 ore. The January output thus far of the Vindicator will average forty tons a day. The Lillie at Goldfields is making a regular output of thirty tons a day. The Silver Mountain Co., at Georgetown, last week, shipped the first car of ore. It assayed $75. D. Wood, near Ouray, uncovered galena ore in the Faith mine, carrying sulphurets, yellow copper and silver.

NEW MEXICO.

The Crown Point group, near Bland, has been bonded by the Cochiti G. M. Co. for six months, during which time $10,000 is to be expended in development. This is practically a sale for an amount exceeding $100,000. The development work amounts to about 1500 feet. The average value of the ore is $30.

The Victor group has been bonded to H. Posey for $20,000 for six months. The Victor possesses a vein 14 feet wide at a depth of 65 feet.

New Mexican: Development work is in progress on the bodies of gold-bearing quartz at Amizett, La Belle, Red River, Elizabethtown, Cochiti, Dolores, Golden, San Pedro, Hillsboro, Pinos Altos, Mogollon, White Oaks and other districts.

The Ortiz Co., a mile from Dolores, is doing extensive work. The shaft is 300 feet. The company employs thirty men. L. C. Erman is Mgr.

ARIZONA.

A complaint has been filed at Prescott in connection with the Crowned King M. Co., suit being begun by O. F. Place, owner of more than one-third of the capital stock of the company, against the company. The complaint alleges that Sheckels and Herrington in 1894 caused themselves to be made joint superintendents of the company's property, and, being in control, had their salaries fixed at $1200 per month to manage a 10-stamp mill and an average of thirty men, besides $550 per month paid the mine foreman, mill foreman, bookkeeper and assayer; that a competent and skillful superintendent can be had for $400 per month, and that the present superintendents work the mine as follows: Sink 100 feet at a time, then stope out all valuable ore and run it through the mill, then shut down the mill and sink another 100 feet, making no development, but in this way gutting the mine. The bill states that only nominal dividends are being paid, and the profits, which should be at least $100,000 per year, are being wrongfully appropriated.

The Mocking Bird mine, Mohave Co., shipped a bar of bullion last week. The Providence G. Co., Yavapai Co., is building a 20-ton chlorination plant. V. H. Igo has bonded a group near Tombstone for $10.000. Ewing & Helmrod have purchased the Kingman Sampling Works. Cushing & Doran have bonded a group adjacent to the Congress mine for $40,000. One hundred and eighty men are employed by the Table Mountain Co. at Klondike. A smelter will soon be in operation. West & Rice of San Francisco are at Kingman awaiting the arrival of the mills they purchased for the C. O. D. mine. The Gold Reef group, in Cochise Co., has been bonded to a Kansas City Co. for $40,000. Active work on a group in the Dragoon mountains has been commenced by an English Co. E. L. Giroux, for W. A. Clark of the United Verde Co., has bonded the Copper Belle group on the San Carlos reservation for $50,000, the date of the bond to commence within thirty days after the completion of the survey which segregates the coal fields from the reservation.

The mineral product for 1897 was $4,136,000 in gold and the silver yield was 1,240,000 ounces, lead 888,000 pounds and copper 64,280,000 pounds.

At the Kassar mine the double compartment shaft is completed to 200 feet and the mine continues to show improvement. The supply of ore is abundant.

Four bars of bullion were brought from the San Miguelita mine in Sonora last week.

The Franco-American in Pima Co. continues development with good results.

The Guijas G. M. Co. shipped a carload.

The Old Glory mine is dropping thirty stamps, running eighty tons of ore daily at a cost not exceeding $1.80 per ton for mining and milling.

The Arizona Copper Co.'s concentrator at Clifton was destroyed by fire last week. The store and smelting plant were saved. The loss is estimated at $25,000.

The Saginaw smelter will work on copper ore from the Silver Bell district. It is said there are 3000 tons of ore on the dump.

The Jerome copper mine comprises eleven

claims located across the vein from which the United Verde people are taking ore. It is developed by a shaft, an incline and a tunnel, which will reach the ore body with 300 feet. The main tunnel is 800 feet below the top of the mountain and leads directly to the plant where the ore will be treated.

The United Verde produced 21,000,000 pounds of copper in 1896, and the production in 1897 was still larger. The mine has been sending out sixty to eighty tons of bullion a day.

Owen McNeely of Kingman last week shipped eighteen tons of seven-ounce gold ore.

Stanton & McClellan shipped twenty-two tons from the Oro Plata.

The Temple Bar Con. M. Co. has twenty men at work at Temple Bar putting in the big piers and glance boom. The company expects to have the work completed before the spring rise in the river.

The Oro Plata mine is said to have struck a body of ore that runs twenty-four ounces gold and ten ounces silver to the ton.

R. Toohey has bonded four claims to J. H. Johnson for $75,000.

A. J. Shotwell has bonded three claims in the Ajo district for $75,000. The property is to be worked 20 feet per month, and necessary machinery erected.

Capt. S. O. Hemenway has a plan for a steam dredger for placer mining on the bar of the Yaqui river, Sonora. The boat is 120 feet in length, 26-foot beam and 3½-foot hold, with a recess 20 feet long by 6 feet wide for the elevator to work in. She will draw 10 inches. The elevator will be 50 feet in length, working 16-inch steel cups bolted to a steel endless chain 18 inches apart. The lower end of the elevator will be protected by a "grizzly," so that nothing larger than 2⅛ inches will enter the cups. The inboard end of the elevator will be elevated 12 feet above the deck of the boat. The cups will discharge their contents into a hopper, with chutes on either side, to two jigs of six compartments each, size 24x36x12 inches, with copper sieve bottoms. The material raised by the elevators will pass over 24 feet of fine meshes, and discharge into a tank 6 feet deep, in which revolving paddles will keep moving.

The lead and silver claims at Castle Dome are producing quantities of ore, averaging seventy-five per cent lead and thirty ounces of silver per ton.

Development on the Free Gold Group, in Chocolate mountains, is being pushed, developing a body of high-grade ore. T. D. McLeod is Supt.

MEXICO.

The Panuco Copper Co., in Nuevo Leon, contemplate the erection of a smelter.

The gold mines of the Panuco district continue to ship ore in carload lots running between two and six ounces of gold per ton.

Two Republics is informed that the Compania Aurifera has $60,000 in its treasury.

Reed & Gunby, who purchased the San Luis mine, near Coronilla, Guerrero, are negotiating for the mines and mill of the Compania Mexicana, in the district of Mina. These are thirty in number, and yield gold, silver and lead.

The San Felipe continues to yield gold ore. This is the only strictly gold property discovered near Coronilla.

A good vein of quicksilver has recently been discovered near Tetela del Rio, and is being developed.

The Santa Rosalia shipped seventeen tons that brought $30,000. There is said to be 4 feet of ore in the shaft, which is past the 250 level.

The Esmeralda, near Minas Prietas, Sonora, has 1300 tons of ore on the dump averaging one ounce of gold to the ton.

The Kansas City Smelting and Refining Co. has obtained a concession for the erection of a smelter at Carmen, on the Mexican bank of the Rio Grande.

It is believed the Miguelita group in Sonora, under bond to ex-Gov. Thornton and associates, will be taken by the final payment of $150,000.

SPAIN.

Spain is the home of 11,806 mining companies, among which are represented the following products: Iron, 3027; coal, 461; lead and silver, 31. In these are employed 62,968 men, women and children in the proportion of 85 per cent, 11½ per cent and 3½ per cent.

SOUTH AFRICA.

The December output of the Rand district was 310,713 ounces—the largest monthly total in the history of that district. The output for the entire year of 1897 is 3,034,675 crude ounces, which about equals 2,433,000 ounces fine gold.

Commercial Paragraphs.

THE Lunkenheimer Co., Cincinnati, has been preparing a shipment of valves and machine fittings for South Africa that will aggregate 26,000 pounds. This company has just consigned 4000 pounds of brass fittings to Sweden.

THE A. Van der Naillen School of Engineering has incorporated in San Francisco, capital stock $50,000. Directors are Albert Van der Naillen Sr., Victoria Van der Naillen, Albert Van der Naillen Jr., Ralph L. Van der Naillen and E. E. Cochran.

THOS. J. BARBOUR, mining engineer of the Risdon Iron Works, returned from New York last week. Mr. Barbour was East on mining business, and while in Boston closed a large contract with the North American Gold Dredging Co. for two dredge boats, each of a capacity of 2000 yards per day. The Risdon Iron Works will build these boats on the Swan river in Colorado, and it is believed that the gravel will be worked for from 3 to 5 cents per yard. Mr. Ben Stanley Revett is the general manager, and after looking over the entire field of dredging decided on Mr. Barbour's statements to place contracts with the Risdon.

Personal.

S. W. TRAYLOR of Denver is in Randsburg, Cal.

C. E. CLINCH of Grass Valley, Cal., is in San Francisco.

W. S. MCKNIGHT is Supt. Old Glory mine, near Tucson.

J. J. YECKEL is Mgr. Evening Star mine at Silverton, Col.

L. DURKEE is the new Supt. Guijas G. M. Co., Tucson, Ariz.

RALPH DILLON, Pres. Jerome Copper Co. of Arizona, is in Denver.

E. BIND, Supt. Gold Hope, near Randsburg, Cal., is in San Francisco.

C. D. LANE of San Francisco is in Washington on his way to Mexico.

J. H. MILLER, Supt. Hilda mine, Sierra City, Cal., is in San Francisco.

P. R. BRADLEY, Supt. Spanish mine, Washington, Cal., is in San Francisco.

JEAN F. WEBB, Gen. Mgr. Pocahontas, at El Dorado, Cal., is in San Francisco.

GEO. MCAULEY succeeds W. Rule as Supt. Mayflower mine, Forest Hill, Cal.

B. HANCOCK succeeds F. B. Wilson as Supt. Iron Mountain mine, Keswick, Cal.

J. C. ADAMS succeeds Sam Silverman as Mgr. Badger mine, Elk City, Idaho.

HON. J. H. NEFF was inspecting mining property this week near Placerville, Cal.

R. C. CAMPBEL-JOHNSON has resigned as Mgr. Queen Eess mine in Slocan district.

FRANK MANSON, Supt. Sierra G. Co., Downieville, Cal., has returned from Chicago.

J. S. LAWRENCE succeeds D. McCarthy as Supt. Pharmacist mine, Cripple Creek, Col.

F. J. MARTIN, Supt. Fortuna mine, has returned from San Francisco to Phœnix, Ariz.

J. WEISSBEIN, Mgr. W. Y. O. D., has returned from San Francisco to Grass Valley, Cal.

J. W. GRAY, M. E., has returned to Oakland from examination of property in Siskiyou Co., Cal.

MR. E. I. PARSONS of the California Wire Works has returned from a business visit to Mexico.

WM. C. REYNOLDS of Chicago, who is interested in California mining properties, is in San Francisco.

RD. ROWLANDS of Placerville, Cal., mining man, is in San Francisco on his way home from the north.

JOHN J. HALPIN of New York, Mgr. Brunswick Con. G. M. Co., Grass Valley, Cal., is visiting the mine.

C. M. SHOECRAFT, M. E., of Nevada City, Cal., has charge of the Nevada county exhibit at the Jubilee Fair.

GEO. CLARK, Supt. Laudecker, Placerville, Cal., has charge of El Dorado county's exhibit at the Jubilee Fair.

H. P. GORDON has returned to San Francisco from superintending a hydraulic mine in the U. S. of Colombia, S. A.

P. LANGHAMMER, Ph. D., who has extensive gold properties on the Similkameen, Wash., is in San Francisco buying machinery.

E. EDGAR BURCLE, D. H. Bromley and F. D. Harvey of London are inspecting American mining methods in this State previous to making an examination of some New Zealand mining properties for an English syndicate.

Recently Declared Mining Dividends.

Parrot Co., Butte, Montana, 6 per cent, $138,000; Jan. 1.

Dutch M. & M. Co., No. 5, 5 cents per share; Jan. 18.

Alaska Treadwell M. Co., 37½ cents per share, $75,000; payable Jan. 28.

Homestake M. Co., South Dakota, 25 cents per share; payable Jan. 25.

Fern Gold M. & M. Co., B. C., 5%; payable Jan. 24.

Alaska-Mexican M. Co., Alaska, 10c per share, $18,000; payable Jan. 28.

Boston & Montana M. Co., Montana, $3 per share; payable Feb. 20.

Recent California Mining Incorporations.

Sheep Trail Con. M. Co., San Francisco; capital stock, $2,500,000; subscribed, $125; W. Bowers, T. Cole, W. Bannan, H. G. Hinckley, R. R. Grayson.

Minnie Con. M. Co., San Francisco; capital stock, $2,500,000; subscribed, $125; same directors.

Santa Teresa Quicksilver M. & D. Co., San Jose; capital stock, $500,000; subscribed, $300,000; H. V. Morehouse, E. A. Hazen, J. B. Kerwin, F. J. Hambly, F. Fisher.

French Gulch G. D. Co., Pasadena; capital stock, $1,000,000; subscribed, $960,000; W. H. Barry, J. Hickler, A. Prenzlauer, W. G. Campbell, S. W. Stone.

Lone Star M. Co., Ontario; capital stock, $1,000,000; to work the Lone Star and Yankee Doodle mines.

North American River M. Co., Los Angeles; capital stock $100,000; subscribed $37,600; C. G. Garrison, H. C. Wood; J. W. A. Off, M. E. C. Munday, J. J. Everharty, J. W. Montague, A. H. Cargill.

French Gulch Gold Dredging Co., Los Angeles; capital stock $1,000,000; subscribed $960,100; W. H Barry, J. Hickler, A. Prenzlauer, S. W. Stone, W. G. Campbell.

Spanish Bar G. M. Co., San Francisco; capital stock $50,000; subscribed $250; J. Hey, H. J. Grauerholz, J. Daisley, J. Klein, W. T. Robinson.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JAN. 11, 1897.

597,252.—THRASHER FEEDER — F. H. Ackerman, Shedds, Or.

597,257.—FRUIT DRIER—A. H. Blackburn, Petaluma, Cal.

597,101.—WRENCH—F. O. Collins, Vancouver, Wash.

597,175.—ANTI-FRICTION BEARING—J. R. Coryelle, S. F.

597,316.—WELL BORER—G. W. Durbrow, Salton, Cal.

597,273.—APPARATUS FOR RAISING LIQUIDS — R. W. Elliott, Brentwood, Cal.

597,237 —GATE—L. M. Hawes, Sacramento, Cal.

596,998.—BICYCLE CANTEEN—Hawkins & Gardner, Jerome, A. T.

597,166 —COMPASS—Heinrich & Wood, S. F.

597,287.—BICYCLE ATTACHMENT—F. P. Hurst, Aurora, Or.

597,167.—VEHICLE JACK—J. F. Killian, Stockton, Cal.

597,116.—TANK—A. W. Krause, Los Angeles, Cal.

597,241.—SCREEN FOR DITCHES—N. Lamb, Yreka, Cal.

597,295.—PENCIL HOLDER—O. R. Pihl, Portland, Or.

597,301.—CHANGE MAKING DEVICE—A. A. Smith, Aberdeen, Wash.

597,336.—HEAD REST—Nellie R. Stone, Bryanmawr, Cal.

597,210.—PEANUT HEATER — T. M. Walker, Portland, Or.

28,159.—DESIGN BEARING BRACKET—R. H. Postlethwaite, S. F.

28,160.—DESIGN BEARING BRACKET—R. H. Postlethwaite, S. F.

28,161.—DESIGN BEARING BRACKET—R. H. Postlethwaite, S. F.

28,153 —BICYCLE CARRIER—R. G. Woodward, Alameda, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CHLORIDIZING SILVER ORES.—Ernst Heiligendorfer, Canelas, Estado de Durango, Mexico. No. 597,238. Dated Jan. 11, 1898. This invention relates to a process for chloridizing silver ores so that a much larger quantity of the precious metals can be saved, and the objections to a combination of chlorination and amalgamation and those attendant upon what is known as a chloridizing roasting process are overcome. It consists essentially in subjecting the ore, either raw or oxidized, to the action of copper chloride in conjunction with chloride of sodium under certain conditions which will produce the reactions with the ores treated, which is especially advantageous with rebellious ores.

SELF-CLEANING SCREEN FOR DITCHES.—N. Lamb, Yreka, Cal. No. 597,241. Dated Jan. 11, 1898. The object of this invention is to provide an automatically operating device by which ditches may be cleared of chips and other refuse which float in the ditches, and also to prevent fish from entering the ditches where the same water is employed in pisciculture. This invention consists essentially of a series of vertical bars or teeth fixed at the lower ends to a horizontal rod and a series of curved teeth fixed spirally upon a revolving shaft, so that these teeth will pass between the vertical bars and lift up any material which may be flowing through the ditch and arrive at these bars. The material is thrown out at one side through an embrasure, where it falls upon the ground or into a suitable receptacle. The revolving shaft carrying spirally arranged teeth is rotated by means of a water-wheel, journaled a little distance therefrom, so that the current of water in the ditch will turn this wheel. A belt or band from the water-wheel shaft to the shaft of the spiral arms will turn the latter. The vertical bars are sufficiently near together to prevent the refuse passing between, and will also prevent young fish which may have escaped from their nurseries from passing, and the revolving arms passing between these vertical bars will lift anything which arrives, and, by reason of their spiral arrangement, discharge it to one side. In the case of fish, they may be delivered into a receiver containing water, so that they can be preserved alive.

SUBTERRANEAN ELECTRIC CONDUIT.—Wm. D. M. Howard, San Francisco, Cal. No. 596,812. Dated January 4, 1898. This invention relates to a means for transmitting and supplying an electric current to movable objects, and is more especially designed to provide a subterranean electric conduit within which the trolley wires, rods or tracks are suspended, insulated, and protected from the action of moisture, the tendency to leakage, and induced currects. The object of this invention is to transmit underground electric currents from conducting or trolley wires to a moving object with safety, economy and durability, both mechanically and electrically, thus conveying a current of high electrical efficiency at a small cost of maintenance, and avoiding the use of the unsightly poles and naked wires employed in ordinary trolley systems, together with the danger arising from such wires on account of the necessary high voltage of the current carried by them. The invention is especially adaptable to the transmission of an electric current to street cars for the purpose of propelling them. The conduit consists of two concentric tubes made of iron or other suitable material, the outer tube enclosing the inner one, which is held in position by iron columns or standards centrally fixed in the bottom of the outer tube and having the inner tube bolted or otherwise secured upon the inner ends of the standards. The outer tube has a longitudinal slot made in the upper part of its periphery, forming a continuous channel through which connection is made from the car to the interior of the tube. The interior tube is left open at the bottom for about one-fourth the circumference and the edges are turned inwardly to form guide rails for a plow or carrier which is adapted to travel thereon. The electric current is transferred from the trolley wires, which are contained in the inner tube, to the moving object, or the circuit is completed by means of the traveling plow or carrier, the plates forming this carrier projecting downwardly through the opening in the bottom of the inner tube, thence curving around so as to encircle this tube out of contact with it and the outer tube. These plates unite in a shank which passes up through the slot in the outer tube and makes connection with the car. A peculiarly arranged truss frame supports the shank and the connected plows, springs being so arranged that a freedom of movement is allowed when the car passes curves, and the plow is allowed to adjust itself to the curvature of the slot.

AUTOMATIC GATE.—Levi M. Hawes, Sacramento, Cal. No. 597,237. Dated Jan. 11, 1898. This invention relates to improvements in gates of that class which are adapted to be opened and closed by the approaching and receding vehicle. It consists essentially of a fixed post to which the gate is hinged, upper hinge pins bent diagonally having supporting bracket braces, corresponding eyes let into and fixed to the top of the inner ends of the gate, concaved segments fixed to the lower ends of the inner gate stiles and corresponding segments pivoted to the bottom of the fixed post having sockets upon each side of their pivot points adapted to engage the ends of the gate stile segments, so that the gate is retained in a closed position when the turnable segments are in their normal position, and is tilted so as to swing when the the segments are turned to an angle.

New York Silver Exports for 1897.

The total exports of silver from the port of New York to all countries during the year 1897 were as follows:

	Ounces.	*Value.*
January	5,443,300	$3,528,470 00
February	5,451,000	3,527,991 75
March	6,596,910	4,168,041 30
April	6,322,000	3,919,640 00
May	5,988,000	3,798,572 50
June	6,724,000	4,038,288 75
July	6,595,950	3,932,135 50
August	6,450,280	3,475,007 18
September	5,958,950	3,292,607 00
October	5,578,350	3,215,999 50
November	5,453,750	3,172,556 25
December	7,628,570	4,414,767 25
Miscellaneous shipments, not previously reported	750,682	427,889 00
Totals	74,941,742	$44,911,965 98

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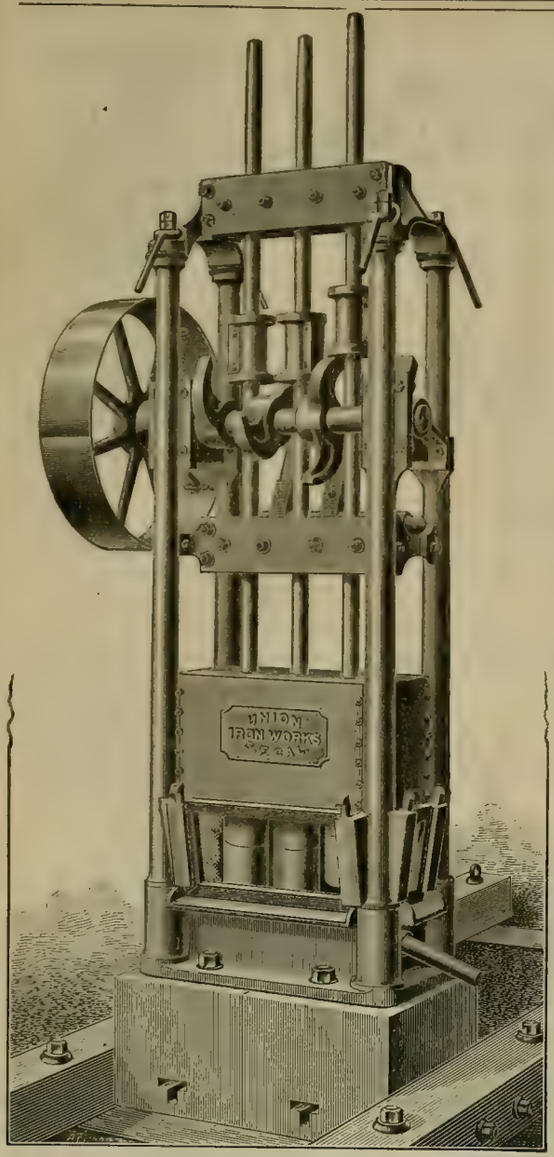
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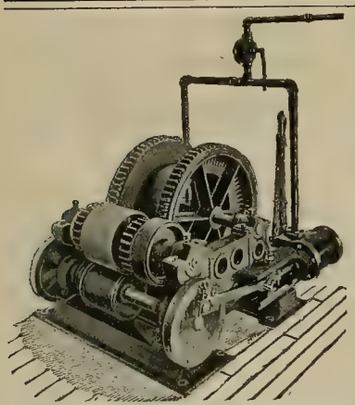
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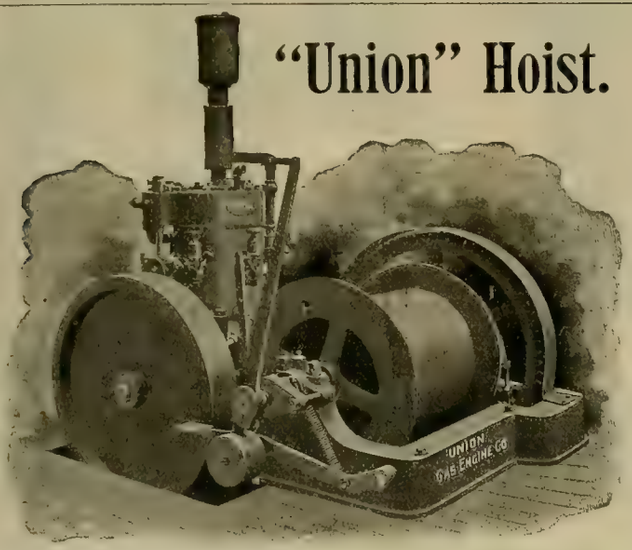
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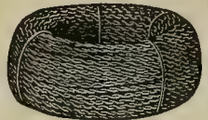




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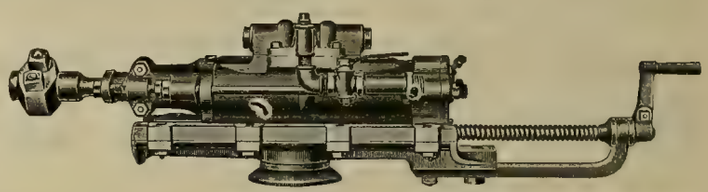
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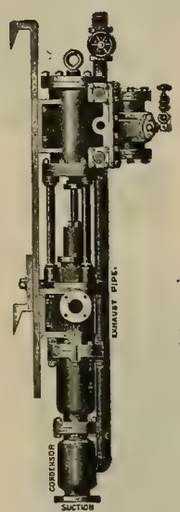
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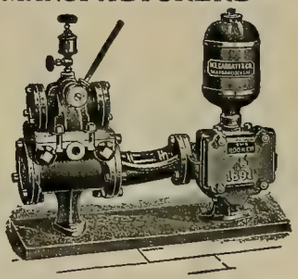
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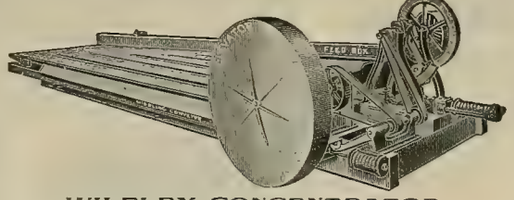
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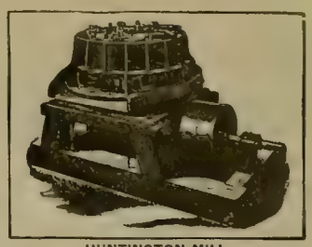
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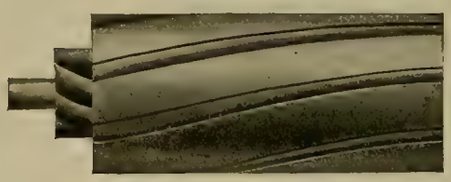
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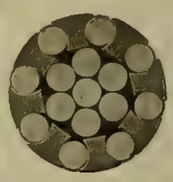


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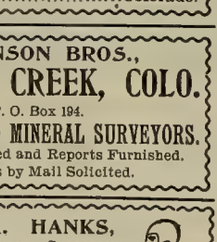
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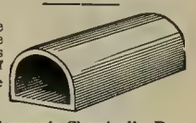
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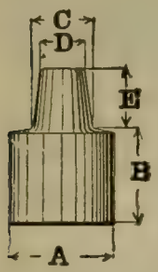
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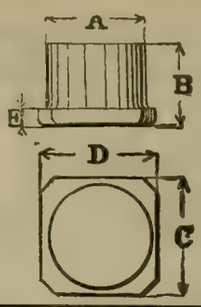
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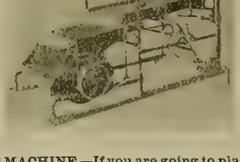
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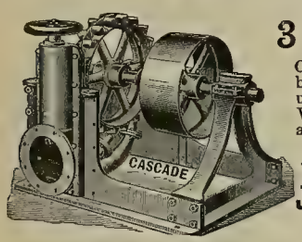
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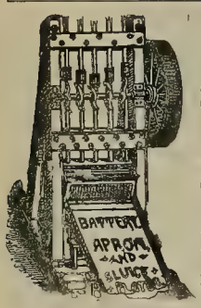


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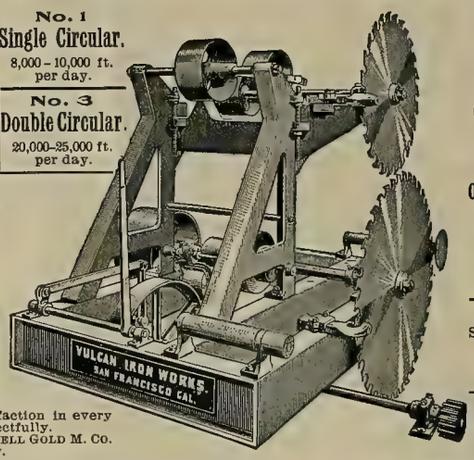
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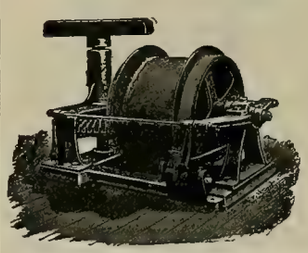
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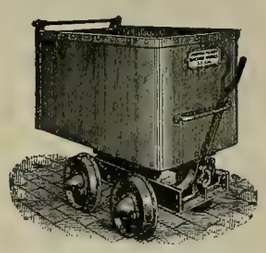
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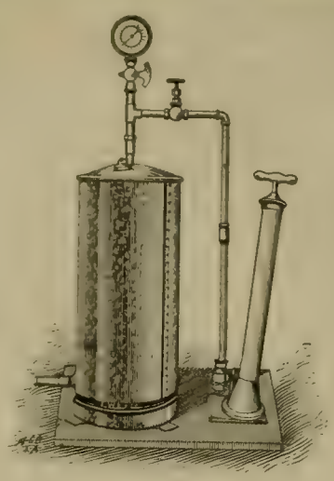
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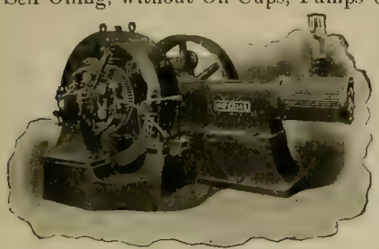
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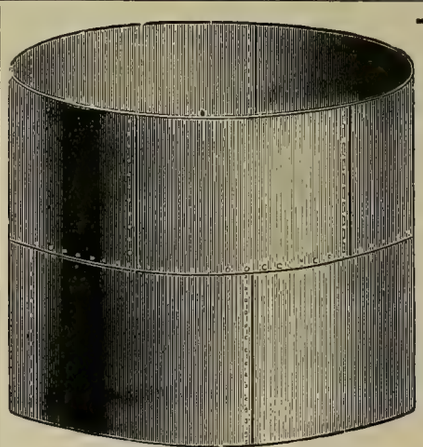
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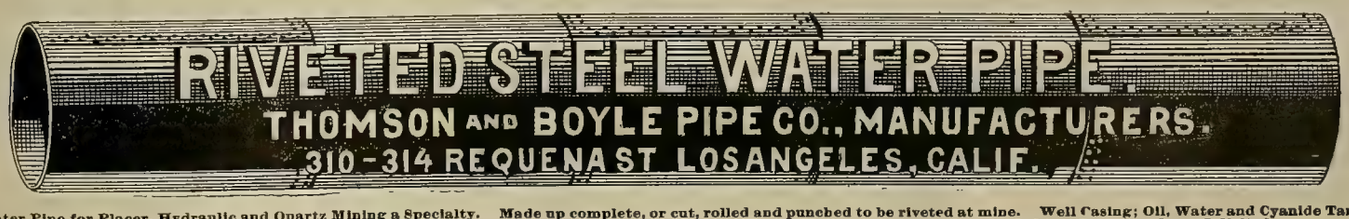
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Market Reports.

The Markets.

SAN FRANCISCO, Jan. 20, 1898.

Jobbers report business quite satisfactory and considerably larger in volume than the corresponding month in 1897. The outlook is of the most promising character for a year of general prosperity with the trade, manufacturers and all business men in general. Rains the past week have improved crops still more, and, with the usual spring rains, California will have the largest grain crop for several years past. This will be of particular advantage owing to Australia's wheat crop being poor, necessitating importing from us by that colony so as to supply her wants. A poor crop there also means more ships to come to this port with coal so as to get cargoes of wheat to England. The rush of gold seekers to the Klondike has set in and promises to increase as the season advances. This is beginning to affect trade, as the demand for several lines of goods is enlarging. It is stated that more California products have been bought already for shipment there within the next three months than have been bought altogether for three years past. This will help us quite materially, Iron workers state that the outlook for business was never before so bright, and they also say that fairly good profits seem assured.

The local money market is inactive, with the supply of funds in bank showing a decided increase. It is safe to say that the banks never before held so much money, although considerable is held at the East. Gilt-edge security and good two-name paper are scarce, and persons having them have no difficulty in securing special rates of discount. The disbursements in this city in the current month are very heavy. The greater portion of it is going back into bank, although there is quite a proportion seeking investment. Savings banks are said to have trouble in placing surplus funds on security called for by law, owing to the call for accommodation being light. The East reports growing ease in the money markets, which is favorably affecting the speculative markets there. There is considerable loaning at New York on sterling. This shows that this country is fast assuming an important position in the financial world so far as loaning money is concerned.

New York Silver Prices.

NEW YORK, Jan. 20. — Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	26	58½
Saturday	26¾	57⅞
Monday	26⅝	57⅛
Tuesday	26⅝	57¼
Wednesday	26⅛	56⅜
Thursday	26¼	56⅞

	Copper.	Lead.	Iron.	Tin.
Fri.	10 85 @11 00	3 67½	10 00@12 25	13 85
Sat.	10 85 @11 00	3 67½	10 00@12 25	13 85
Mon.	10 85 @11 00	3 65	10 00@12 25	13 80
Tue.	10 85 @11 00	3 65	10 00@12 25	13 80
Wed.	10 85 @11 00	3 62½	10 00@12 25	13 80
Thur.	10 90 @11 00	3 62½	10 00@12 25	13 80

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.83¾
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	56⅞
Mexican Dollars nominal	47@—

SILVER.—The market at home and abroad has settled to lower prices, although at the close there appears to be a slightly better tone. The decline is doubtless sentimental and owing to reports that India will adopt the gold standard, but advices point to increased money requirements in China, Japan and India, but more especially by the latter, which will call for more silver. There is no doubt that the market is quite sensitive and rises and falls according to the demand. The last steamer hence for China took out $99,000 in bullion for China and $64,000 for Bombay.

MEXICAN DOLLARS.—The market has been fairly steady notwithstanding a lessened call. The last steamer hence for China took out $198,500.

COPPER.—The market has held to fairly firm prices.

Our market is quoted as follows:

Ingot casting, jobbing	—	@13
Ingot " wholesale	—	@12½
Sheet copper	—	@16½
Bolt ¾ and 5-16, 20c; ⅜ and larger, 16½		

TIN.—Imports of ingots aggregated nearly 1400 from Australia the past week. The market for both plate and ingot is easy and buyers of round lots find no difficulty in securing concessions.

The market is quoted in jobbing lots as follows:

Pig, per lb., jobbing	—@	15
Plate, I C coke, heavy, per box	$4 10@4 25	
" " " light, "	4 00@—	

QUICKSILVER.—The last steamer for Mexico took out 100 flasks. The market is quiet but steady.

LEAD.—The market has shaded off still more at the East, closing barely steady. It is stated that corroders are not buying much, but when they enter as free buyers values will appreciate.

Our market is quoted in jobbing lots as follows per 100 pounds:

Pig	4 75 @	5 00
Sheet	@	6 50
Pipe	5 30 @	5 80

IRON.—The imports continue fair. The consumption is largely in excess of the corresponding month in 1897. The East reports very active markets, with the outlook pointing to a considerably larger output this year than in 1897, which was the largest on record. This will be due to a larger home consumption and a heavy export movement.

SHOT.—The demand is good at current quotations.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

COAL.—The market is strong, with the tendency for near-by, spot and yard advancing owing to a scarcity of vessels for coal carriage from coast ports—all in service to Alaskan ports.

Receipts of coal for the week ending Tuesday were as follows in tons: Comox 1500, Puget Sound 5840, Departure Bay 2336, Coos Bay 1120; total, 10,796 tons.

COKE.—The market is steady.

PLATINUM.—The market is steady.

Our market is quoted in a jobbing way at $15 per ounce and for scrap $10 an ounce.

BORAX.—The market is firm with a good demand ruling.

The market is quoted as follows:

Refined, in carload lots, in barrels	7
Refined, in carload lots in sacks	6¾
Powdered, in car lots	7
Concentrated, "	6½

ZINC.—The market is firm.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 45 to 50 cents per pound for ingots.

ANTIMONY.—The market is steady.

POWDER.—The market is firm at current quotations.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9 to 11c, according to strength and quantity.

Chemicals.

There is an improving demand, but as yet it does not make itself felt enough to change the general situation. The East reports a fairly steady market, but no change in prices outside of nitrate of soda, which fluctuates.

CYANIDE OF POTASSIUM.—The market is steady.

Our market is quoted for chemical pure 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The demand is quiet.

We quote in a jobbing way at 1¾c per lb for 66%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported firm from store at 6½@7c per pound in carboys.

BONEASH.—There is a fair demand.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady.

We quote in a jobbing way at 4c per pound.

SPELTER.—The market is steady.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is firmer.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steadier at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA. — The market is steady.

Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

Mining Share Market.

SAN FRANCISCO, Jan. 20, 1898.

The market has been draggy all week. Prices have not varied much, but the general appearance of the market was made to look as if it would go to pieces at any time. To keep outsiders from buying, points are out, "Don't buy yet, but very soon." If shares are a buy soon, then at the current cheap prices ruling for such as Savage, Union, Mexican, Chollar, Belcher, Crown Point and several others, buyers cannot lose much, if anything, and stand a chance of at least 16 to 1 of making "quite a little killing" before spring passes. The writer has been commenting on the mining share market for over twelve years, and he has yet to see a spring pass that prices do not move up from three to fully ten times, and some seasons even more, than the low prices at which sales were made in January. It is quite safe that the coming spring will be no exception, notwithstanding the reports put out that there is no ore, and deep mining must be done so as to revive the Comstock. Active exploiting work is being done in several of the Comstock mines, while preparatory work is being done in some of the others for active exploiting. This work, if all confirmed information is not misleading, will unquestionably result in striking ore. Aside from the work on the Comstock, that on the Brunswick grows in interest as the work in several advances in the direction stated by the two experts that will result in striking ore that will pay well. It is expected that it will take several weeks yet before the objective point is reached. This makes the shares of the mines, Occidental, Potosi, Chollar, Savage, Gould & Curry, Best & Belcher and Con. Virginia, located on that lode a good gamble—particularly the lower priced ones. Inside points are still out that Con. Virginia must sell lower before it is safe for outsiders to buy. If this keeps the latter from buying, then who is taking the shares sold on the two exchanges? Probably not within the history of speculation in mining shares has a year opened so favorable as 1898 for promoting a big bull campaign. There is a plethora of funds at every financial center in the United States, notwithstanding over $60,000,000 have been loaned at New York on sterling bills, and this money can be drawn from England when required. Mining is attracting attention at home and abroad and money is forthcoming in almost any quantity desired to invest in any kind of proposition which promises a fair return. Reports from the Klondike confirmatory of rich gold mines are increasing the desire to invest in mining speculation on this coast and it would not take much to create a mining share craze.

The news from the Comstock mines is practically about the same as reported last week. The important work heretofore noted in several is being pushed ahead, and as each day passes, brings them nearer the objective point; this is particularly the case in Sierra Nevada. While the street looks for the downward continuation of the ore to be cut by the Riley tunnel this month, our advices do not warrant expecting it before some time in February. The shorter time has been put out by the mining share manipulator for the purpose of having reports circulated that "it is a failure," so as to depress the market. In Utah they are still driving ahead in north drift with formation of a generally favorable character. In Sierra Nevada they have about finished repairing the north drift on the Layton tunnel. They are again driving ahead in the Riley tunnel. On the 900-foot Union shaft level they have advanced west crossdrift No. 5 about 100 feet. It is likely they will stop this crossdrift just in time not to strike the west lode. In Union they are still drifting ahead the No. 2 east crossdrift from raise above the 900-foot level. In Mexican they are going east on the 1000 foot level in the north drift from the Ophir shaft station. No change is reported in the general formation. It is in over 625 feet. The west crossdrift in Ophir on the 1000-foot level is in about 800 feet. A crossdrift is being run also on the Central Tunnel level. Work in Con. Virginia is reported to be confined still to the 1550-foot, 1650-foot and 1750-foot levels.

So far as the official letter reports, there has not been any change in the character of the work on the different levels, neither has there been any change in the formation. A west crossdrift from an upraise above the 1650-foot level is passing through streaks of rich ore which goes over $50 to the ton. The west crossdrift on the 175-foot level in Andes is in porphyry and quartz. It is in over 30 feet. They have resumed work in the Best & Belcher and Gould & Curry joint east crossdrift on the 800-foot Bonner shaft level. In Savage the work and formation is about the same as reported last week. No work in Hale & Norcross. They have put in two sets of timbers in the Chollar mine incline above the 1100-foot level. They are still repairing the main airway on the 1000-foot level.

In Potosi on the tunnel level the joint Potosi-Bullion south drift is being driven ahead. They are also going east from the sixth floor of the south upraise, tunnel level. They are still repairing and retimbering the old Crœsus shaft in the Bullion. In Alpha they are repairing the north drift on the 500-foot level and also putting in drain pipes. In Con. Imperial they continue to drive the long west crossdrift ahead. The flow of water continues strong. From Confidence, Challenge and Yellow Jacket nothing new comes to hand. No work is reported in Kentuck. There is nothing new reported in the letters from Crown Point, Belcher, Seg. Belcher and Overman. The work is practically the same as reported last week. They ought to strike the ore soon that they are running for in Justice.

Interest continues to be largely centered on the Brunswick lode, and if expectations are realized operators will come to the front as buyers of the shares. The management of Occidental have the courage of their convictions, for they continue to buy the shares, believing that the prospects warrant them to look for an important strike of ore. The west crossdrift in this mine on the 500-foot level is in over 20 feet. On the 650-foot and 750-foot levels no change is reported in the work. The main south drift of the 750-foot level is skirting the footwall. At last advices it was in fair grade ore. In Potosi they have made air connection between 500-foot and 600-foot, and commenced work in the south drift on the former level. On the 500-foot level west crossdrift No. 3 is being run ahead. In Chollar repair work is engaging about all their attention. It will be through soon. So far as official letters go there is no change in the work in Savage or in the joint work of Con. Virginia, Best & Belcher and Gould & Curry.

The following illustrates the changes of the week:

Mines.	Jan. 13.	Jan. 20.
Alpha		
Alta Consolidated		
Andes		$ 14
Belcher	$ 38	39
Best & Belcher	50	
Bodie		
Bullion		09
Challenge	21	
Chollar	26	27
Confidence	80	
Consolidated California and Virginia	1 20	
Consolidated New York		
Crown Point	27	29
Exchequer		
Gould & Curry		34
Hale & Norcross		
Justice	31	
Mexican	25	22
Ophir		58
Overman		09
Potosi	30	
Savage	17	
Sierra Nevada	60	55
Union	38	37
Utah		
Yellow Jacket	35	32

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 20, 1897.

9:30 A. M. SESSION.

100 Andes	14	100 Sierra Nevada	55
400 Overman	09	250 Yellow Jacket	32

SECOND SESSION—2:30 P. M.

100 Ophir	58	100 Sierra Nevada	60
200 Mexican	22	250 Bullion	09
100 Gould & Curry	34	100 Union	37
600 Chollar	27	300 Occidental	1 50
300 Crown Point	29	50 Standard	1 50
500 Belcher	39		

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Strange as it may seem, that big family paper, the *Illustrated Weekly Sentinel*, of Denver, Colorado, (founded 1890) will be sent ten weeks on trial for 10c.; clubs of six, 50c.; 12 for $1. Special offer solely to introduce the paper. Gold rings set with Rocky mountain gems are given free as premiums. Latest mining news and illustrations of grand scenery each week, also true stories of love and adventure Address as above and mention PRESS. Write today; postage stamps taken.

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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from O. M. Henry, in the Murphy Diggings, near Volcano, Amador Co., to deposit tailings in Rancheria Creek; from Geo. A. Gritton, in the Clap Board Gulch Mine, near Volcano, Amador Co., to deposit tailings in Sutter Creek; from Frank J. Goyan, in the Cox Mine, near Placerville, El Dorado Co., to deposit tailings in a ravine; from J. M. Longnecker, in the Hull Placer Mine, near Genesee, Plumas Co., to deposit tailings in a ravine; and from E. Becker and Robert Mooney, in the Homestake Mine, near Amador City, Amador Co., to deposit tailings in Rancheria Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on February 7, 1898, at 1:30 P. M.

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MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	58	10c	Dec 3	Jan 7..Jan 28	J E Jacobus, 309 Montgomery
Bullion M Co, Nev	51	5c	Dec 17	Jan 21..Feb 12	R R Grayson, 331 Pine
Challenge Con M Co, Nev	24	10c	Dec 16	Jan 19..Feb 9	C L McCoy, Mills Building
Chollar M Co, Nev	45	20c	Jan 8	Feb 11..Mar 8	C E Elliot, 309 Montgomery
Fall River Con G Q Co, Cal	11	5c	Jan 15	Feb 25..Apr 21	A Lorsbach, 313-315 Front
Marina Marsicano G M Co, Cal	12	9c	Jan 3	Feb 7..Feb 28	Chas Bovone, 217 Sacramento
Mexican G & S M Co, Nev	58	15c	Jan 6	Feb 10..Mar 3	Chas E Elliot, 309 Montgomery
Occidental Con M Co, Nev	29	10c	Dec 7	Jan 11..Feb 1	A K Durbrow, 309 Montgomery
Red Cap M Co, Cal	2	$5	Nov 29	Jan 6..Jan 29	H H Martin, 125 Beale
Savage M Co, Nev	94	20c	Jan 6	Feb 8..Feb 28	E B Holmes, 309 Montgomery
Sierra Nevada S M Co, Nev	114	20c	Jan 19	Feb 23..Mar 14	E L Parker, 309 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19	Feb 26..Mar 21	A F Frey, Phelan Building
Union Con S M Co, Nev	55	15c	Dec 6	Jan 11..Jan 31	A P Swain, 309 Montgomery
Utah Con S M Co, Nev	26	5c	Dec 2	Jan 6..Jan 24	A W Havens, 309 Montgomery

Rainfall and Temperature.

The following data for the week ending 5 A. M., January 19, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Total Seasonal Rainfall to Date.	Average Seasonal Rainfall to Date.	Minimum Temperature for the Week.	Maximum Temperature for the Week.
Eureka	1.14	17 74	23 04	12 49		36	54
Red Bluff	34	6 60	12 09	13 26		32	54
Sacramento	.24	5 28	7 19	9 48		30	50
San Francisco	32	5 12	11 14	11 81		38	52
Fresno	.07	2 38	4 90	4 02		28	54
San Luis Obispo	12	2 52	9 75			28	62
Los Angeles	.04	3 75	8 44	8 10		36	66
San Diego	39	3 14	6 09	4 46		38	62
Yuma	T	1 06	4 76	2 10		28	64

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Assessment Notices.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco. California. location of works, Sunny Hill, Shasta County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 3rd day of January, 1898, an assessment (No. 12) of 9 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

THE SAVAGE MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 6th day of January, 1898, an assessment (No. 34) of 20 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

FALL RIVER CONSOLIDATED GOLD QUARTZ Company.—Location of principal place of business, San Francisco, California; location of works, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 15th day of January, 1898, an assessment (No. 11) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 313-315 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on THURSDAY, the 21st day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. LORSBACH, Secretary.

Office—313-315 Front street, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Humboldt County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 29th day of November, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Harvey M Binckley	2	1	5 00
Alice E. Binckley	20	4	20 00
Alice E. Binckley	23	20	100 00
Alice E. Binckley	24	20	100 00
Alice E. Binckley	25	20	100 00
Alice E. Binckley	26	20	100 00
Alice E. Binckley	39	1	5 00
Alice E. Binckley	40	2	10 00
Caroline S. Townsend	18	20	100 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the corporation, 125 Beale street, San Francisco, California, on SATURDAY, the 29th day of January, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

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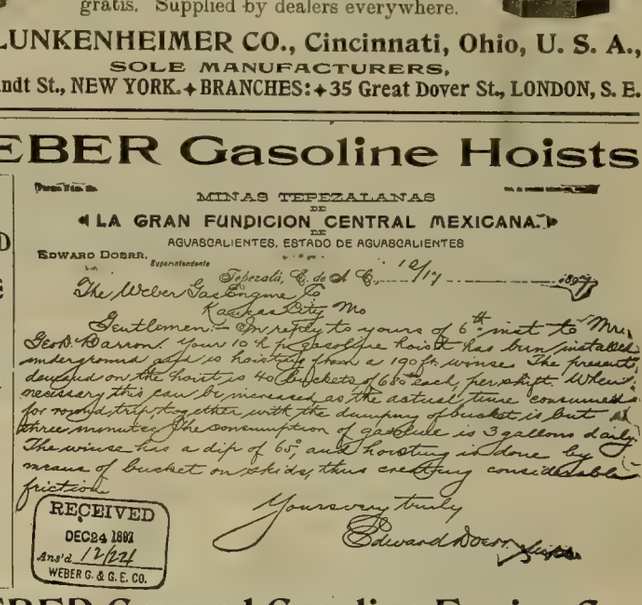


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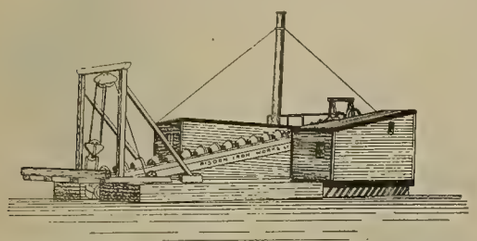
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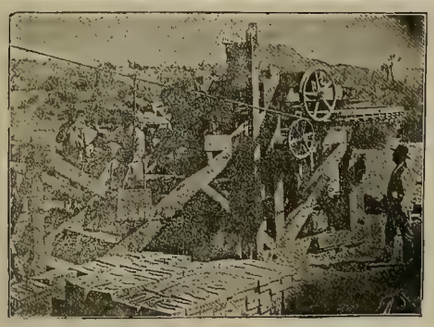
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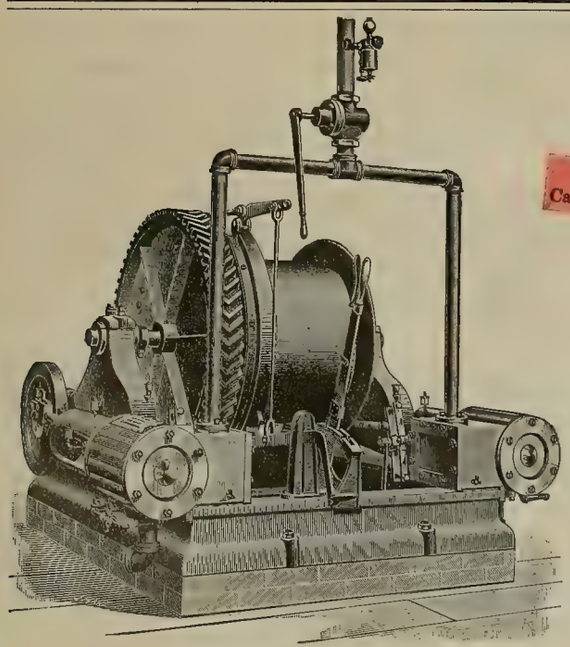
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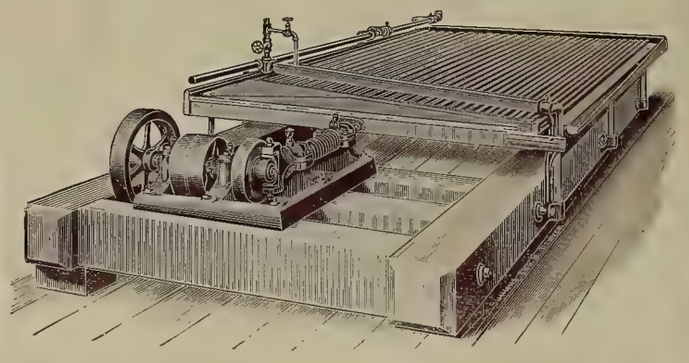
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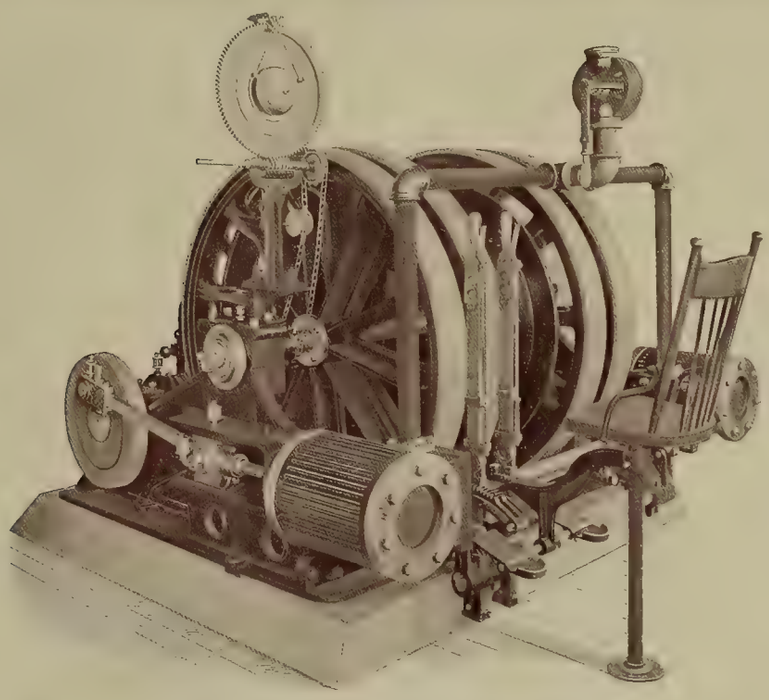
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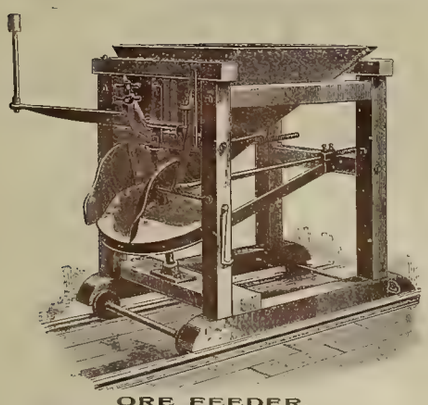
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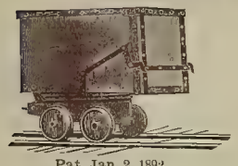


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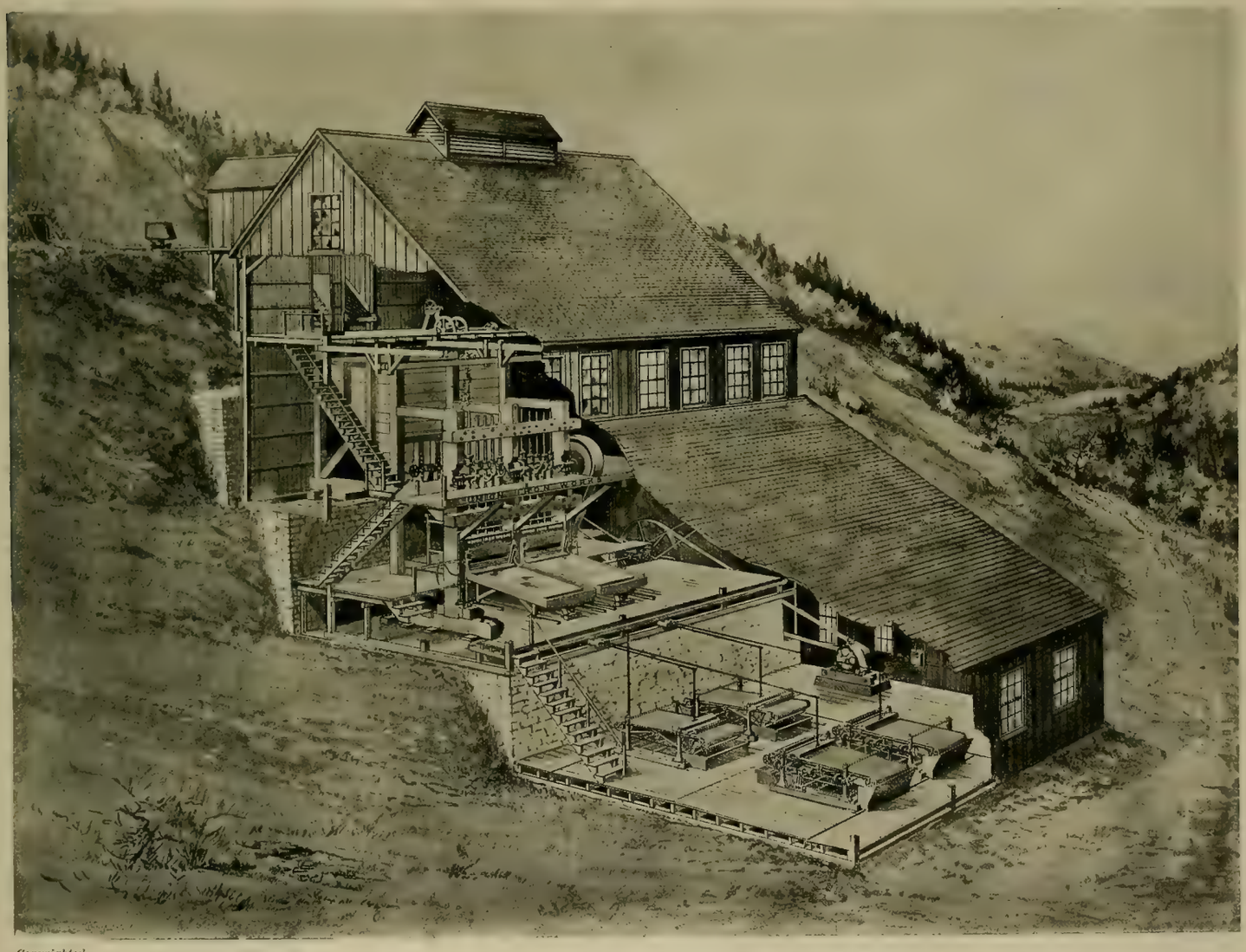
A Model California Stamp Mill.

Elsewhere in this issue appear correct portrayals of early mining appliances in California. The engravings are mostly reproduced from the original wood cuts made for the MINING AND SCIENTIFIC PRESS by Nahl and other pioneer artists thirty-five years ago. By way of contrast between the past and the present it was desired to place on this page a California stamp mill of '98, and through the courtesy of the Union Iron Works a large perspective view, drawn to the scale, was made especially for this issue, of which the above is a reduced engraving. It speaks for itself and requires no note or comment. It is a correct portraiture of a model California 10-stamp mill, with direct electrical connection, etc., and is believed to be the embodiment of present improvement on the first stamp mill in this State, which was built in the winter of '50–'51, and of which considerable is said elsewhere.

It is a long step from the ancient arrastra portrayed on page 114 to the modern stamp mill, and the progress is largely the result of accumulated practical experience on the part of California builders and designers of mills, and California millmen in the handling of the various gold ores. Time was when a yield of 40 per cent was a good average—these figures being now more than doubled in daily results. Many old miners recollect when anything less than $20 ore could not be worked at a profit. California gold ore is being to-day worked at a total cost of 60 cents per ton for mining and milling.

The tendency in modern California stamp mill practice is to run at what is considered a high rate of speed, making 100 drops per minute, and increasing the weight of the stamp, which sometimes weighs as high as 1000 and even 1400 pounds, the height of drop varying from 4 inches to 12 inches above the top of the die. The chief difference between the California and Colorado stamp mills is in the weight of the stamps and their speed. An average Colorado stamp will weigh 550 pounds, with thirty drops per minute, of from 6 to 20 inches. The average duty of the Colorado stamp is one ton per twenty-four hours; in California, with ore of like hardness, two and one-half to four. The ore is dissimilar, and what is good practice in Colorado would be poor in California, and vice versa. As a rule, California ore does not require to be so finely pulverized as that of Colorado. Science may be defined as organized knowledge, and art as the application of science; and in this regard both California and Colorado methods may be considered as scientific evolutions from knowledge bought by costly experience. It may further be said in this regard that the highest percentage of gold saved from mill plates does not always indicate the highest financial prosperity. If 85 per cent of the gold can be saved at a not excessive cost, where the saving of an additional 5 per cent would cost largely more than that extra 5 per cent would amount to as a commercial proposition, it would not be considered good mill practice to attempt the saving of the extra 5 per cent; though, as a general thing, the higher percentage saved the better the ore pays.

But a word, however, is to be said in this short notice regarding the amalgamating tables. It will be noticed in the engraving that they are wider than the short apron and narrow sluice plate of the old California mill, giving better service and being deemed a great improvement on former practices.



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PERSPECTIVE VIEW OF MODERN CALIFORNIA TEN-STAMP MILL.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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San Francisco, January 29, 1898.

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SO FAR as known, the South African gold yield for '97 was $55,000,000, of which over $51,000,000 was from the Witwatersrand district.

THE 1897 production of gold in California is estimated to aggregate $18,500,000. To date California has produced over $1,300,000,000 gold.

DURING '97 exports of silver to the Orient from London aggregated $37,255,807; from New York City to all countries, $44,911,966; from San Francisco to the Orient, $11,156,202.

TO THOSE who are not regular readers of this paper it is due to say that many of the usual features are necessarily omitted in this issue to make room for articles of general and timely interest.

MR. B. M. NEWCOMB, general superintendent of three California quicksilver properties, states that during the calendar year 1897 the Etna Con., Napa county, Cal., produced 3600 flasks of 76½ pounds each, the Napa Con. 6400 flasks, and the New Idria, San Benito county, 3605.

THE greatest depth ever attained on the Comstock, Nevada, lode was in the Union Con. in the north end—3350 feet—just fifteen years ago, when the clamor for dividends caused the mines to be allowed to fill with water. Many miners argue with considerable show of reason that to unwater and push deeper would unearth a third bonanza.

GOLD AND COPPER occupy a present unique position in mining products. Copper is the only metal whose price has materially advanced in recent years. Gold is the one product of all others that is above and beyond the ordinary laws of supply and demand. In the case of gold the buyer seeks the seller, the market is unlimited at a fixed price, with no competition and transportation charges at the minimum.

A NOTICEABLE feature in California mining in '97 was the increased production of copper, due largely to the steady output of the Mountain Copper Co., which is now credited with a very large daily output of matte from the smelters which goes from Keswick to Galveston, Texas, by rail, thence by sea to Newport News, Virginia, where it is again transferred by smaller vessel to the company's refineries at Elizabeth, N. J.

The Semi-Centennial Celebration.

Never in the history of any American commonwealth was there a more hearty, widespread and spontaneous accord in the celebration of an important event than that in response to the modest little suggestion in this paper last August that the fiftieth anniversary of the discovery of gold in California could and should be fittingly celebrated. California has set so high a standard for celebrations, and San Francisco is so noted for its efforts in that regard, that to set a new record was more than ordinarily difficult. It is with pleasure the fact is here recorded that the celebration of the epoch—for epoch it is—has been fully commensurate with all expectations. What the landing of the Pilgrims was to the North Atlantic coast, or the coming of the Cavaliers to the South Atlantic coast, the rush of '49 was to this coast. This last event practically gave half a continent to the United States, and did more than any one thing since the Revolutionary War toward making this the foremost nation of the earth. The thought of what California would be today had no gold been discovered here, in contrast to what the State is and what it will be, sufficiently emphasizes this point so far as this coast is concerned. The knowledge of the great impetus given to populating the region west of the Rocky mountains by the discovery which gave a billion dollars in gold to the nation when it needed it the most demonstrates the historic magnitude of the discovery.

The fitness of celebrating such a great event so appealed to the good sense of everybody that it required no argument. The only question was, "How shall it best be done?" and the answer culminated this week in a magnificent commemoration. The beginning was the great procession of the 24th inst., which was nearly three hours in passing a given point, the cost of each minute of those three hours being over one thousand dollars. The preceding sentence partially illustrates the scope of the parade. To fully realize what that parade meant, a sight of it alone was necessary to the thoughtful. The parade itself was a record maker and a record breaker; it exemplified the entire history of California; everything in it was typically Californian, and the history of fifty years was written in its lines. Wherever the eye turned history was seen moving in living form. There rode four of the men who gathered round Marshall on that historic morning when he picked up the first gold nugget at Sutter's Mill; there rode such men as General Bidwell, who were here in 1841; there rode the pioneers of those earlier years, the men who could with truth say, "All of which I saw, and part of which I was;" there rode aged women, who were belles "before the Gringo came." Every department of California mining, mercantile, mechanical, manufacturing and social life was represented; turning from the men with whom the shadows of life slope eastward, the eye fell upon thousands and thousands of native sons and daughters, marching in solid array; and to fittingly round out the stirring scene, came, with steady step, thousands of boys and girls from the public schools of California. The music, banners and floats; the thousands of United States military troops and State militia; the allegorical representations—all these have been duly described in the daily press. The effect of the whole thing was something sublime—far more than the ordinary parade, gorgeous as the ordinary parade may be made. It was symbolical of California everywhere; California's golden colors, showing the whole gamut of human life and emotion, played in the yellow sunlight of that January day. It was something to be long remembered.

In the subsequent literary exercises of the day, Niles Searles, "the old man eloquent," and others, did full justice to the great theme.

The entire week has been given up to festivities of various sorts, and to-night the Golden Jubilee Mining Fair is to be opened with elaborate ceremony. This Mining Fair is deserving of a visit from every one at all interested in gold mining in any of its forms; and any one contemplating having anything to do with mining for gold within the sunny limits of this commonwealth, or elsewhere throughout the world, will find it a school of instruction during the next five weeks.

The occasion throughout has been a great one and has been greatly commemorated.

THOS. A. EDISON is now credited by the daily press with the assertion that his magnetic process of working iron ore in New Jersey justifies him in extension of his achievements to working gold mines. In an alleged interview he is quoted as saying that "by a new process which I have invented I can profitably mine ore which contains as little as $1.25 gold to the ton, and I prefer low to high grade ores. In mining gold I shall employ substantially the same process that I am now using for mining iron. When I speak of mining it is not in the sense that the term is generally used. The day of the old-fashioned miner—the man who digs the ground with a pick—is past so far as I am concerned. I have no use for him. My mining is all done by machinery, and it does the work after a fashion that is practically automatic." So much is published in sensational dailies as being said and sung by Mr. Edison and other distinguished men that the appearance of an "interview" needs more than ordinary newspaper statement to carry credence. It is possible Mr. E. may have said something like the quotation, but not probable. Mr. E. or anybody else would find considerable difficulty in gold mining to dispense with "the man who digs the ground with a pick." He is also credited with saying that "at present it is impossible to profitably operate gold ore going less than $1.25 per ton," which is not in consonance with the facts. At various places on this coast gold ore yielding less than $1.25 per ton has been and is being profitably treated.

THE 1960th issue of the MINING AND SCIENTIFIC PRESS is intended to commemorate the fiftieth anniversary of the discovery of gold by James W. Marshall in this State at Coloma, El Dorado county, on the 19th of January, 1848. Most of its contents is naturally of a reminiscent nature, though, like the State and the industry it represents, the MINING AND SCIENTIFIC PRESS does not rest content with the recital of what has been done. Such crude engravings as those on pages 107 and 114, which were fine in their day, and which are reproduced from the pages of this paper of thirty years ago, are in marked contrast to the finer work of the artist by the methods of '98, as shown on pages 103 and 130; and the trade announcements are of themselves a sufficient epitome of up-to-date methods of scientific mining. A very large edition has been printed, and it is believed that this issue will be referred to for the next half century as authoritative illustration of what has been done during the eventful fifty years since the finding of the historic nugget changed the history of this entire west half of America.

THE estimated value of the silver mined in Montana in '97 is $20 550,000 at its coinage value, as compared with $20,324,887 for '96. Silver, under its present conditions, must continue to be a by-product, for the most part. An increase in the tonnage of the Butte copper mines will increase the production of silver, while a decrease in the number of tons mined from the copper producers means a decrease in the production of silver. While less lead was produced in Montana this year than last, its value was greater, owing to higher prices. The value of the estimated production of lead mined in Montana during '97 is $750,000.

NEVADA papers are saying some bitter things about the Peck Bros., who have been operating a new process for treating tailings. At the time the process was introduced an effort to secure some technical data for publication herein was met by the statement that the process was "a secret one." The results do not seem to share in that attribute.

THE Czar's big Siberian road will cost $200,000,000. When it is completed it will be possible to go around the world in thirty-three days. From New York to Bremen seven days; Bremen to St. Petersburg, one and a half days; St. Petersburg to Vladivostock, ten days; Vladivostock to San Francisco, ten days; to New York, four and a half days.

The Mother Lode of California.

Written for the MINING AND SCIENTIFIC PRESS by
ROSS E. BROWNE, Mining Engineer.

The so-called "auriferous slate belt" of California, in which the Mother Lode occurs, begins south of Mariposa county and extends northwesterly along the western flank of the Sierra Nevada to the north line of Plumas county, and doubtless further, but is thence covered with vast sheets of barren lava. As described, it is about 250 miles long and twenty to seventy miles wide, and forms about one-third of the precious mineral-bearing area of the State—so far the most productive part.

This belt is composed of a more or less conformable series of highly tilted slates and metamorphic schists, with intervening layers and occasional intrusions of igneous rocks. The general strike of the strata is northwesterly—parallel with the axis of the Sierra—and the dip very steep to the northeast. The cleavage of the slates corresponds practically with the tilted bedding planes.

Within this area are vast accumulations of auriferous gravels, and a countless number of gold-bearing quartz veins, commonly following the strike and dip of the strata, occasionally crossing them. Only a small per cent of the great number of these veins contain gold enough to pay the expense of mining and milling, though they all contribute value to the gravels. However, there are in the belt several zones and irregular areas, within the limits of which the veins contain more than the average amount of gold and have produced many valuable mines. The most important of these better mineralized areas are the Grass Valley and Nevada City district, the so-called Mother Lode belt, and the east belt of Tuolumne and neighboring counties.

The Lode.—The Mother Lode is centrally located in the "auriferous slate belt," and is remarkable for its great length and strength, extending over 100 miles in a northwesterly direction through Mariposa, Tuolumne, Calaveras, Amador and El Dorado counties. It is a continuous series of parallel quartz veins, following more or less persistently a narrow belt of soft black slate. This belt is bounded laterally by harder slates, greenstones (diabase) and nearly allied schists (amphibolite), serpentines and occasionally by masses of intrusive granitic rocks. The strike of the strata is between north and west, while the dip varies from 60° to the northeast to 80° to the southwest, but is most commonly 70° or 80° to the northeast. Near to the surface the tilted strata are usually bent downward with the slope of the hill. In some of the sections they stand vertical or even dip to the west.

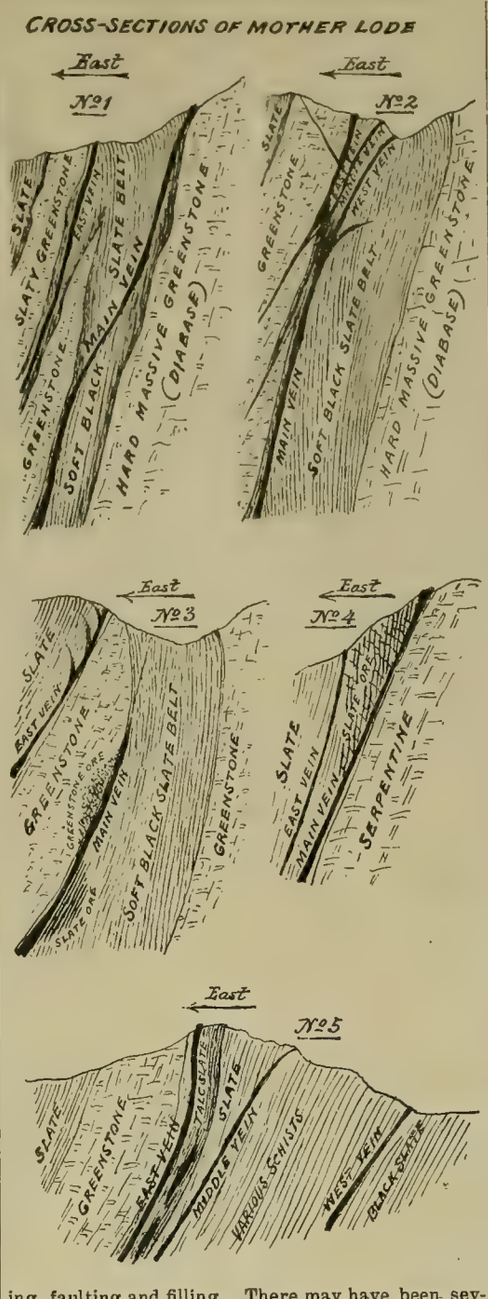
The veins follow the slates very closely in strike, but cut the strata at acute angles on the dip, being 10° or 15° flatter. The average dip is between 50° and 70° to the northeast. The veins are generally in the black slate either wholly or at one of its contacts with greenstone or serpentine, but occasionally they pass, for short distances, entirely into the amphibolite schist or slaty portions of the greenstone.

Cross Sections.—Several typical cross sections of the lode are herewith presented.

Continuity.—The actual continuity of a single vein throughout the entire 100 miles length is not apparent, and it is not believed that such will ever be definitely established. With more development it is probable that continuous veins will be traced through Tuolumne and Amador counties where the lode is well confined within narrow limits, but there are difficulties in the way of connecting these through the central part of Calaveras county where the branches are widely scattered.

Probably there occurred, at some time while the mountain masses of the Sierra were uplifting and readjusting, one great break and fault following the length of the soft slate belt as a line of least resistance. This break is doubtless represented in some sections by one or two large fissures only and in others by a great number of small fissures following the strata, overlapping and interconnecting somewhat obscurely.

The filling of such fissures would form one great vein with a system of interconnected branches. But there is no authority for assuming that the various veins of the belt represent but one period of fissuring, faulting and filling. There may have been several distinct periods, and upon this depend some important questions of identity and the propriety of applying the term "Mother Lode" to the main vein as the feeder of all others of the section.



The Quartz Bodies.—The main vein always carries a strong gouge either on the foot or hanging wall. The quartz bodies forming the ore shoots occur in lenticular masses from a few inches to fifty feet or more in thickness, from one hundred to one thousand feet long in strike and often of greater extent in the direction of the dip. They are irregularly distributed along the line of the great fissure. Between these bodies the line of fissure is marked by gouge matter, smooth walls, etc., and is easily followed. The walls are more or less ribbed and polished—evidences of motion.

A green mineral, known as mariposite, colors great masses of the veins, and characterizes a large portion of the lode, notably in Mariposa, Tuolumne and the south end of Calaveras counties, to some extent in El Dorado, but not to any important extent in Amador.

Concerning the trend of the ore shoots in depth, various local rules are put forward, but all that may be said in a general way is that they go down on the dip and are longer in that direction than with the strike, but are otherwise quite irregular in outline.

The Ores.—The ore bodies are mainly quartz, more or less mixed with stringers of slate or bunches of greenstone. They are at times partly colored with mariposite, and usually include some seams of calcspar.

The ores contain free gold and gold-bearing sulphurets—mostly iron pyrites, with more or less copper and arsenical pyrites, and occasionally galena and zincblende. In large quantities the ores carry from $1 to $25 per ton in free gold, and from 1 to 4 per cent of sulphurets valued at $40 to $125 per ton. Ores containing less than $7 per ton are considered low grade, $7 to $12 medium grade, above $12 high grade. The average pay ores contain 1 or 2 per cent of sulphurets worth $75 to $100 per ton. Rich sulphurets generally mean good values in free gold—poor sulphurets the contrary.

There are occasional occurrences of rich telluride ores, notably in the northern part of Tuolumne and southern part of Calaveras counties, but they seldom form any important part of the ore output of the mine.

The gold is mostly fine and pretty well distributed along the length of the ore shoot. There is apt to be quite as wide a variation in values across the thickness of the vein as along the length of the shoot.

Coarse gold is generally exceptional, but has been found in considerable quantities in some of the sections—for example in the southern part of Calaveras county, where more than $1,000,000 worth of coarse gold is said to have been obtained by the early miners.

So-called ribbon rock is characteristic of a great part of the lode. It is quartz ore with a banded structure, due to many black slaty seams parallel to the walls of the vein. The structure is more pronounced near to one of the walls, usually the foot. In well mineralized sections of the lode the ribbon rock contains the better values—the slaty seams being rich. It occurs as well, however, in poorly mineralized sections, where it contains little value, of course.

Quartz often extends from the vein irregularly into more or less shattered portions of the wall rocks—in large part by substitution, it is believed. This quartz occasionally carries sufficient valuable mineral with it to form considerable bodies of profitable ore, usually low-grade, however.

In some sections of the lode there are extensive bodies of "mineralized" talcose slates, directly associated with one of the main fissures. These sometimes contain several dollars per ton in fine gold and have been mined to some extent near to the surface.

The hanging-wall slates, near to the surface, are in places fissured and traversed by a great number of small seams of quartz, carrying coarse gold. Many such bodies have been mined by open-cut work, but peter out or become unprofitable in depth.

At the northerly end of El Dorado county, where the mother lode belt divides and apparently scatters, there are a number of so-called seam diggings—occurrences somewhat similar to the above, but not directly connected with a large fissure, at least not apparently. These are belts of soft, finely laminated slate, somewhat talcose, seamed with innumerable veinlets and stringers of quartz, and containing considerable coarse gold. Most of the seams cut the laminæ at very acute angles, while others are nearly at right angles. These belts are 100 or 200 feet wide and have been mined to a considerable extent by open-cut work, especially at the Georgia Slide and Spanish Dry Diggings.

The average thickness of the underground ore bodies, so far mined in the lode proper, has been probably five or six feet, varying from one to fifty or more. The average yield has been about $10 per ton, varying from $3 to $25. But it must be borne in mind that the greater part of the ore has been extracted from the richer sections of the lode. With the new enterprises now under way, and the larger milling capacities, the average yield will doubtless be reduced to $5 or $6 in time.

The Gold Product.—The total product of the lode is difficult to estimate with any satisfactory degree of approximation.

Several of the mines have yielded between $5,000,000 and $12,000,000 each—the Keystone, Old Eureka, Utica, Plymouth Consolidated and Kennedy—several others $2,000,000 or $3,000,000, and a great number between $100,000 and $1,000,000 each.

There is more work done on the lode in Amador than in other counties, and the yield there has been over $35,000,000 and probably less than $50,000,000. The product of the entire lode, exclusive of the pla-

cers partly derived from it, has doubtless been more than $70,000,000, and less than $100,000,000.

For a number of years past the lode has been yielding about a fifth of the State's annual gold product, and its entire yield has been between a quarter and a third of the quartz mining product of the State.

The more productive mines have been very profitable.

Treatment of Ores.—The treatment of the ores is, of course, by simple stamp milling, amalgamation of the free gold, concentration and subsequent chlorination of the sulphurets. The tendency of late has been to use coarser screens and thus increase the capacity of the mill and avoid unnecessary sliming of the sulphurets. Formerly two tons to the stamp per day was deemed a good average; now it is three or four.

The process applied to these ores is cheap and efficient, costing from 50 cents to $1 per ton, and yielding from 90 to 95 per cent of the gold content.

Cost of Production.—The cost of production by the prevailing methods of working is shown by the records of a number of important mines on the lode, which have been continuously operated for the past ten or fifteen years. From these it appears that the average expense, after establishing the plant and sinking the shafts far enough to begin the development and extraction of ore, has been about $5 per ton of ore milled. This includes, besides the cost of immediate mining and milling, the dead work required to keep the ground opened ahead, the minor additions to the plant, the repairs, etc.—it is practically the difference between product and dividend.

The dead work once completed, it has at times been found profitable to break, hoist and mill ores of as low grade as $3 per ton.

Several of the better equipped mines are now operating at a materially less cost—less, it is claimed, than $3 per ton. This may be so, but figures based upon accounts covering short periods should not be too readily adopted as averages.

Reducing the Cost.—The importance of reducing the operating expenses per ton of ore milled is even greater than might at first appear. The quartz bodies of the lode yielding between $2 and $5 per ton are much more numerous and greater in extent than those yielding more than that amount. With the operating expense at $5 per ton there was only a small part of the length of the lode promising an attractive return for the expense of opening, but with figures reduced to $3 the area of vein promising profit is much greater—doubtless several times greater.

In considering how the cost per ton may be reduced, the following approximate subdivision of running expenses is of interest: First, cost of operating the mining plant, including the power supply, labor of topmen, repairs to machinery, etc.—20 or 25% of the total operating expense; second, cost of labor and supplies consumed in making the underground excavations, tramming, etc.—25 or 30%; third, cost of timbering in supporting and maintaining the underground excavations—25 or 30%; fourth, cost of treating the ores, milling and chlorination—15 or 20%; fifth, cost of management, 5%.

It will be seen that the bulk of the expense is connected with the mining, *i. e.*, the work of excavating, protecting the openings and delivering the ores to the surface—the cost of treating the ores is relatively small.

It must be said, furthermore, that the prevailing methods of mining are far less satisfactory than the prevailing methods of treating the ores, and that the improvement of the former offers by far the greater opportunity for important saving.

The methods of opening the mines for deep work, the hoisting capacity of the shafts, and the manner of protecting the openings (the timbering), particularly, call for improvement.

Methods of Opening.—The mines of the lode have generally been opened, and, with few exceptions, are still being operated through inclined shafts closely following the vein. The reasons for this are evident. The ground near to the vein is soft and easily excavated, and good progress in sinking can be made at small first expense. The approximate following of the vein on its dip enables, from the start, frequent inspection and test of the ores as the work progresses.

The typical incline has two hoisting compartments and a ladderway. The first cost in sinking and timbering is from $30 to $50 per running foot, and the progress from 10 to 25 feet per week.

The hoists are small, double-geared, and provided for running both with steam and water power. The water power is generally cheaper, but steam relay is necessary in case of accident to the water supply.

Pine wood is used as fuel, costing $4 to $7 per cord. Water costs 15 or 20 cents per miner's inch per twenty-four hours (15,000 gallons). It is claimed that pine wood at $5 per cord is about as cheap to run the works with as water power under 175 feet fall at a cost of 20 cents per inch.

The rock is hoisted in large self-dumping skips carrying loads of two or three tons.

The amount of water encountered in the lode is small, amounting to a flow of 1 to 10 miner's inches (10 to 100 gallons per minute) in each mine. This is mostly surface water, not extending to very great depth. As a rule, if all the water above the 700 or 800-foot levels is caught up and delivered to the surface, the balance of the ground in depth remains practically dry. This water is generally handled in the same way as the rock, in preference to pumping.

Owing to the soft swelling ground near to the vein, the timbering requires close attention and frequent repairs. The dip of the lode is somewhat irregular, varying occasionally from 45° to 70° in a single section, and in trying to follow it even approximately there occur bends or marked changes in the inclination of the shaft. The ultimate result is great expense of repairs and material reduction of the safe speed of hoisting.

These disadvantages are not felt in the beginning, but invariably become matters of serious concern when considerable depth is attained. After reaching depths of 1500 or 2000 feet, the cost of keeping a single incline in barely passable repair is occasionally as great as $4000 or $5000 per year, and the safe speed of hoisting is lowered to 300 or 400 feet per minute, reducing the capacity to such an extent that there are required two or three such inclines to supply a 60-stamp mill. In fact the limit in depth where low grade ores may no longer be profitably worked is reached long before there appears any serious drawback due to natural causes.

Vertical Shafts.—Messrs. Thomas & McClure of the Gwin mine have made a step in advance. They put down a vertical shaft to tap the vein under the old works at a depth of 1500 feet, and are now supplying a 40 stamp mill with 150 tons of ore per day at less than the usual cost. When their mill is enlarged, they will doubtless reduce the running expense per ton of ore very materially.

The Merced and Oneida companies are also opening their mines with vertical shafts, and it is understood that the Kennedy and Wildman companies are contemplating the sinking of deep vertical shafts to operate through. The Oneida shaft is down nearly 1500 feet and is designed to tap the vein at 1750 feet. It is equipped with a hoist easily capable of supplying an 80-stamp mill with ore from a depth of 2500 feet or more. The works were designed and erected by Mr. H. C. Behr and are the most capacious on the lode.

The advantages of the vertical shaft for deep working are manifest. It is removed from the lode, in firmer rock, is easily kept in repair, and is adapted to rapid hoisting. A single shaft may be made to do the work of several crooked inclines and thus make a great saving in the operating expenses.

It is true that much greater lengths of crosscut are required to reach the vein, and this disadvantage is prohibitive in developing flat veins such as those of Grass Valley and Nevada City with dips of 25° to 45°; but in the case of the Mother Lode, with an average dip of 60° or 70°, it becomes less significant.

The cost of the Gwin shaft is understood to have been not more than that of the average incline—$35 or $40 per foot. The Oneida shaft is larger, in harder rock, and had much more water to contend with; it cost about $65 per foot.

The Oneida shaft was laid out with the length of the collar parallel to the croppings of the vein and the strike of the slates. It was expected that the strata would pitch to the east, but they were found vertical through the depth of the shaft, and the ground was exceedingly difficult to break in consequence. Machine drills could not be used to advantage, it being impracticable to put down machine holes otherwise than parallel with the seams and strata, giving the powder little chance to break and throw the rock. The progress made by hand drilling with three shifts of six men each was forty to eighty feet per month; average sixty. The amount of water handled is from two to ten miners' inches, according to the season. Had the collar of the shaft been laid out to cut across the strike of the slates, better progress would certainly have resulted, and the experience is worth remembering.

It may be said that the incline is the preferable means of prospecting, developing and working the mine to moderate depth, while the vertical shaft is much the better for operations to great depth.

Beginning with a virgin mine on the lode, the start is very properly made with an incline following the vein. After operating to depths of 800 or 1000 feet it is found that the expense of repairs is rapidly growing, while the capacity of the incline is rapidly diminishing. Then is the time to stop and inaugurate a better system of work, if the showing justifies it. But an oversanguine spirit, impatience and improvidence are apt to prevail. If in good ore, it is generally preferred to follow the old system as long as it pays expenses, with the hope of finding something still better. An unfortunate turn destroys confidence and credit, and the mine, which might have paid well under better management, is closed indefinitely. This is doubtless the history of a number of the mines. Some of them were better managed—others have paid notwithstanding bad management—still others never had an attractive showing.

Developments.—In order to illustrate the proportion of the lode already worked, if we should plot it all upon a longitudinal section, it would impress us as insignificant compared with the area still unexplored in depth. The greater part of such area is, of course, likely to be poor, but there are many sections in it attracting test, and some with values practically established.

Twenty or thirty shafts have been sunk on the lode to depths exceeding 1000 feet—two of them exceeding 2000 feet. The developments made have inspired the utmost confidence in the permanency of the main fissure, and its mineralization—in fact, it is commonly asserted that the lode improves with depth, but this claim is doubtless oversanguine.

In Amador county the Kennedy mine, after developing low and medium grade ores down to a depth of 400 or 500 feet, passed through a comparatively barren zone, and at a depth of 900 feet encountered a high-grade ore body extending down 1000 feet farther and yielding several millions of dollars. Quite recently a new body of high-grade ore was opened at a depth of 2200 feet.

The neighboring company, the Argonaut, encouraged by these developments, but with a very poor showing on the surface, put down a deep shaft, and at a depth of 1000 feet made an apparently equally valuable discovery.

The Utica mine, in Calaveras county, proved richer in depth than at the surface; and the same is said of a few others.

But there are several important mines of the lode developed to depths of 1200 or 1500 feet with much poorer results below the 800 or 900-foot levels than above.

All these tests have naturally been made in sections with a good showing on the immediate surface or near at hand.

Chance in Depth.—The facts doubtless warrant the assumption of just as good a chance of discovery at great depth as near to the surface. The chance is certainly favorable in most of the sections which have been good on the surface—depending, of course, to some extent upon local conditions.

There appear excellent reasons for confidence in the main fissure—the lode proper—to greater depth than the miner is likely ever to reach.

Width of Belt.—As already stated, the Mother Lode belt is alternately widespread, containing many parallel veins, and narrowly confined, with only one or two important veins. The width generally recognized as the area within which the main fissure may be sought varies from 100 feet to a mile or two.

The greater number of the more valuable discoveries have been made in the narrower sections thus defined, but several notable exceptions prevent the adoption of a rule. All that may be said properly is that great strength of fissure is one of the important factors in making a great and lasting mine, and is more apt to be found in the better confined than in the widespread section—but the conditions which favor the strongest mineralization are little understood and doubtless complicated.

A Field for Deep Mining.—The rich spots on the surface of the lode, the poor man's diggings, have long since been exhausted, but unfortunately many of the claims awaiting proper test are still held by men unable to open them and unreasonable in their expectations. Such men retard development.

There remain to be tested a number of sections which were good on the surface but became poor at moderate depths, and many more which show only low grade ore on the surface.

On the whole there is an excellent field for deep mining in the better mineralized sections of this Mother Lode, but it is one that should be entered only with large capital and a rational mining spirit.

Literature.—The geological features of the lode are best presented by Mr. Fairbanks in the State Mineralogist's Tenth Annual Report, 1890, accompanied by a map showing approximately the distribution of the various enclosing rocks, and the line of most important claims; also by Messrs. Lindgren and Turner in the published atlas sheets of the United States Geological Survey. The latter are considered the most authoritative regarding the surface formation, but the scale is too small to illustrate the location of individual mines.

There is a certain amount of information to be had concerning the mines of the lode in the United States Reports on Mineral Resources, in the various reports of the State Mineralogist, and in the files of the MINING AND SCIENTIFIC PRESS Probably the best information to be had concerning the early workings is in the volume of Mineral Resources of 1868.

It must be said that in view of the importance of the subject there is a notable dearth of accurate and reliable information to be had in published form. A correct map of the underground workings, with a detailed history of the values of the ores, and the more important experiences in mining, would be of great value in the future. Many expensive mistakes will doubtless be made owing to lack of information which might be furnished by a suitable system of record.

It is believed that a good purpose would be served if the State should compel the filing of such information where it would be open to public inspection. It is greatly to the interest of the mining industry to discourage deception and narrow-minded secrecy.

Origin of the California Stamp.

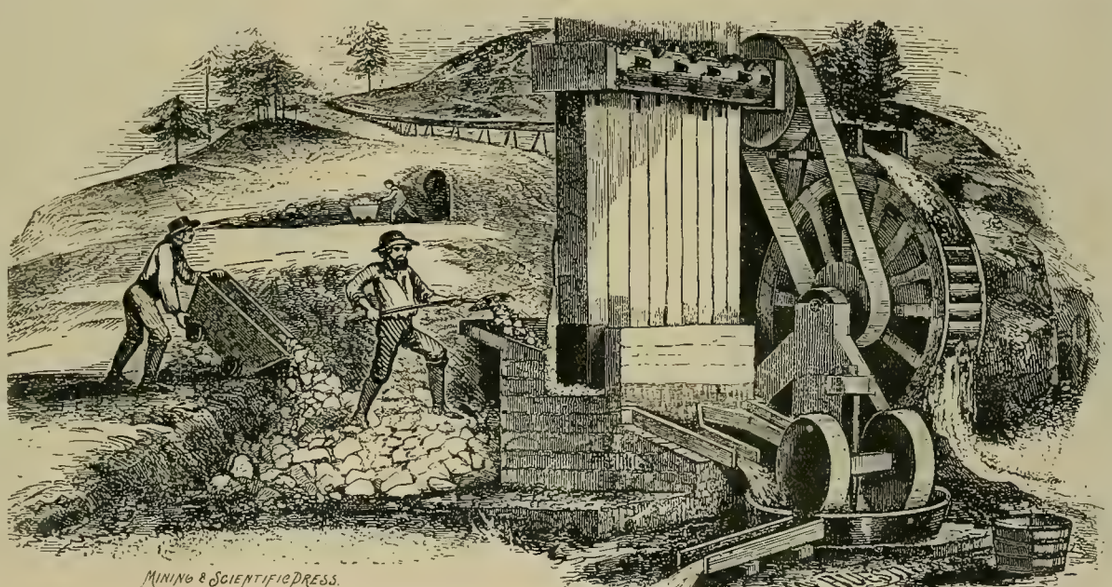
Written for the MINING AND SCIENTIFIC PRESS.

In the winter of 1850–51 a company was formed in Placerville, El Dorado county, California, for the purpose of exploring for gold-bearing quartz. The region chosen for exploration was from Mathenas creek west on both sides of the north fork of the Cosumnes river and as far west as Shingle Springs. Much hard and unsuccessful work was done and continued until about the 8th or 10th of April, 1851, when it was decided to settle up our company's affairs and disband. But before separating, and as we were sitting about our campfire, someone proposed that we explore a certain difficult region that had been neglected. The proposition was agreed to. It was also agreed that we go in pairs, taking three different but (roughly) parallel routes, returning to camp by the trails at night and sharing the results (if any) equally.

A discovery was made. The last two men to get into camp brought word that they had found large outcroppings showing gold everywhere. They had found what was afterwards known as the Union quartz mine, and later as the Church-Union, and is now owned by Senator Perkins and others. The discovery was made on the 12th day of April, 1851. To make sure of our title we moved immediately and made our camp on the ground claimed. After cutting away the brush and building a wagon road down to Mathenas creek, about half a mile distant, we rested and began to discuss what we should do with our discovery. It was decided presently that the only thing we could do was to build a quartz mill and work our mine.

In the meantime the Tennessee Quartz Mining Co. below us on the Cosumnes river, having heard of our discovery, sent us word that they had a steam engine, and iron shaped and punched for a boiler, together with the machinery and irons for a complete five-stamp mill—a duplicate of one they had erected and were running. If we wanted a mill they would sell us the duplicate. We had often seen theirs in operation, and immediately decided that one like it would answer our purpose.

Now leaving out here a long, long story, I will only say that the mill was bought and set a-going, and paid for. None of the present generation can ever know what that meant in the spring and summer of 1851 here in California. This was not, however, the "California stamp mill," but was the mill out of which that was developed. Let us take a look at it.



FIRST STAMP MILL IN CALIFORNIA.

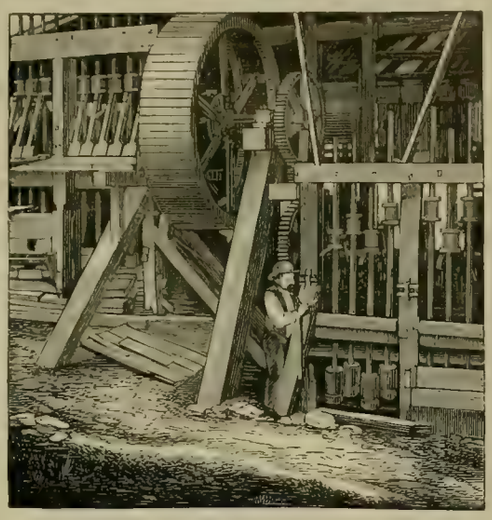
We see no California improvements yet. It was just such a mill as had been made in Tennessee and other Southern States previous to the discovery of gold in California. The bed for the mortar block and the battery frame consisted of layers of timbers crossing at right angles, tamped with sand and flooded with water. On this was placed the frame of the battery, and between the posts was fitted the mortar block, not standing on end and deep in the ground as now, but lying on the ground, as did all the timbers under it. It is easy to see now how springy and unsuitable such an arrangement was.

On the block was placed a low mortar, and the sides were built up of plank and carefully secured with rods and bolts and screws. But, alas! what a leaky affair. In the mortar stood five stamps, each consisting of a head 18 inches long by 6 inches square, *without any shoe*, and a timber 10 feet long by 7 inches square. Through this timber was a slot wide enough to let the cam play freely through it. The upper end of this slot, when the cam stood on the die, was about on a level with the upper side of the cam shaft and was the point at which the cam took hold of the stamp to lift it up and drop it, the stamp being kept in place by suitable guides, top and bottom. The cams were much straighter than the tangent cams now used.

There it stood. It looked to our inexperienced eyes all right. Indeed, we felt a little proud of it; thought we had a better mill than the Tennessee Company. But on starting it we soon found the weak point.

Two of the stamps had become much shorter than the others. On opening the mortar, we found the two stamps had parted from the head. Of course the dove-tail tenon was destroyed and the lower end of the timber badly bruised. The stamps were all taken down and the fastenings to the iron head more carefully fitted.

After being replaced and having run several hours, we found that the heads were of the softest iron and had assumed the shape of a sled-runner,



EARLY CALIFORNIA STAMP MILL.

next to the feed opening. The battery was left standing and a man dispatched to Sacramento with sketches for a boss provided with a shoe. This shoe had a tenon which fitted a corresponding jaw in the lower end of the head. The shoe was held in place by a key driven through jaw and tenon, the key-holes being arranged so as to have a "draw-bore" effect.

We ran that battery till some time in the winter of 1851–52, but (without specifying further) everything about the stamps and mortar proved unreliable. Every forenoon was spent in repairing, the battery calling for the main part.

Not far from us another mill was built soon after ours, but was never run much, as the ore did not pay. One day I went over there. I found it boarded up close and apparently deserted. However, I turned trespasser and, loosening a board, went in. I found the stamps like ours, except that the lower end of the stem was square-tapered and dropped into a correspondingly square socket in the top of the boss. At the lower end of the boss was another square socket, which corresponded to a square-tapered horn on the shoe. This horn was provided with fillets at the corners of each of the four faces, bringing the bearings close to the corners of the socket.

This, however, had proved a bad arrangement, for a number of the corners of the sockets were broken out by the force of the two fillets on each corner of the horn. The remedy for this difficulty was easily indicated. Make the horn and socket round. This led presently to the idea of making all the parts to the stamp round instead of all square, and make the stem of iron. At this point came into view a fairly clear vision of the stamp as we see it now in a California stamp mill. But as yet it was only a vision.

I told my brother (president of our company) what I was thinking of, and directed the carpenter to make a model of a stamp as above described. The stem was about 3 feet long by 1 inch in diameter, the boss being 2½ by 6 sinches long. The shoe was 2½x2½ inches, and all held together by the tapered horn and stem forced slightly into the tapered sockets in the boss. This was the first concrete form of the California stamp.

Armed with this model, my brother and I decided to approach certain of the company and propose the building of a battery on this line. This was received with some favor, but the company as a whole would only consent to putting in one stamp in the middle of the old battery for the purpose of trying it; at the same time enjoining me to make it as cheaply as possible.

Well, this was something. So I left the next morning for Sacramento. No iron was there such as I wanted, which was a piece of shafting 10 feet long by 3 inches in diameter. I went to San Francisco. No iron was in all the town of that size, but Messrs. Egery & Hinckley had two pieces, 12 feet by 2¾ inches, one of which was sent up to Sacramento to the Sacramento foundry. Here, in due time, a stamp was fitted up and sent to the mill, and put in place of the middle wooden stamp. On starting, it won its way easily. It came down with such evident efficiency that it was not long before the company decided to have a new battery. This was in the autumn of 1851.

Incidentally, while down at San Francisco for iron for this one stamp, I had learned from Mr. Egery (of Messrs. Egery & Hinckley) that they had afloat a small lot of 2¾-inch shafting that would be due early in the following February. So all we could do was to wait for that iron.

I came down about the 6th of February, 1852, and found the iron had come. As we could use the old battery as it stood, all we needed was the five new stamps and their fittings. These, I remember, Mr. Egery sent us with very gratifying promptness. It was not long before we had our new stamps running.

But in this first battery the stamps did not revolve. They were held from turning by a short arm from the top of each stem, standing out at right angles to the cam shaft. The outer end of these arms played in suitable slots.

We had an engineer and machinist in our employ, who took great interest in our new stamps. His name was Isaac Fisk, a man full of resources in his line. He suggested the idea of modifying the tappet so as to present a full face clear round the stem, and, removing the arms and slots, let the stamps revolve at will. But our old-fashioned cams were not curved enough, nor was the curve drawn on the right principle. A simple investigation showed that the corner of the cam would rake across the corner of the tappet during a part of the lift, and it was thought that both would be ruined directly. But Fisk contended that it would work, so we tried it on one stamp, and found that the constant turning of the stamp so distributed the lubricant (pitch-pine tar) that there was practically no cutting. This was the first revolving stamp. We presently fitted the other four in the same way.

We found we had made a great improvement and our mill was soon attracting much attention. Revolving iron stamps were soon in use in various directions, and from that day to this only slight modifications have been made in them.

At this point I might close this paper, as, strictly speaking, your question has been answered. The battery, however, as a whole, has been greatly improved. I will give a list of the principal improvements:

1. The Automatic Ore Feeder: I applied for and received letters patent for an automatic feeder in 1858. My principal claim was for a lever regulated by a set screw as and for the purpose described. This claim held for twenty-one years, the patents

having been renewed in 1872, as provided by law at the date of that patent. This lever proved to be indispensable, and is used on all the ore feeders in general use. Thomas A. Cochrane of Tuolumne county was the most successful improver of the original device.

2. The Gib Tappet: The late Zenas Wheeler in 1862, then a mill manager at Gold Hill, Nevada, improved the original tappet of 1852, calling the modification "the gib tappet." This was further improved by Prescott, Scott & Co. (now the Union Iron Works), by casting the tappet with the gib in place and then boring out all together.

3. The Latches and Billet of Wood: I had what answered for the latches, but the billet of wood placed between the faces of the tappet and cam as a remedy and simple way of placing the stamps on the latches out of the reach of the cams I did not discover. I would like to know the genius who first did that.

4. The Mortar Block: This, as now made, is *set on end* and deep in the ground. Originally the mortar stood on timbers laid flatwise.

5. The Mortar: A high mortar instead of a low one, with sides built of wood.

6. Tangent Cams: A good improvement.

The origin of the four last is unknown to the writer. Besides these there are some minor devices that a battery man would not be ready to spare, the origin of which cannot be traced.

I have made some effort to discover the origin of those shoes with square-tapered horns which I found in the deserted mill. I know the men who built the mill, and also the firm that furnished the machinery and castings. But they have all passed away except E. T. Steen of this city. He remembers the mill very well, but does not remember any details.

C. P. STANFORD.

A Pioneer Miner.

Herewith is presented an excellent picture of a typical California miner—Almarin B. Paul—one of the men who made California history, and one who can say, "all of which I saw, and part of which I was." Mr. Paul is now in his 75th year. He was educated at the St. Louis University, came to California in 1849 as a merchant, was for a time head of



ALMARIN B. PAUL.

the firm of Paul, White & Co. of Sacramento, but, having a greater fondness for mining than merchandising, sold out in the fall of 1850 and in the spring of '51 went to Nevada county. Senator Geo. Hearst was for years his partner in mining. He is to-day one of the oldest quartz miners in the State of California. In 1853 he became a resident of San Francisco, engaging in the real estate business; in 1855 published the *True Californian*, in company with Washington Bartlett, afterwards Governor of California, and his brother. He was an active member of the Vigilance Committee of 1856. In the fall of 1856 he closed out all business in San Francisco and again went to Nevada county, where he entered at once into mining, building a mill within sixty days of his arrival there. He remained in Nevada county until April, 1860, when he went to Washoe, examined the Comstock lode and was so taken with its apparent riches that he concluded to remove there, and at once entered into a contract with the several companies for working their ores at $30 a ton. He took contracts amounting to $450,000 and agreeing, before a pound of iron was cast or a stick of lumber cut, to have a 24-stamp mill, with twenty-four pans, up and running in sixty days, or forfeit $40,000. The mill was put up and running in just fifty-eight days from date of signing contract. Considering that all machinery had to be hauled over the mountains, this was a daring piece of business; but he did it. This was the first silver mill on the Comstock and in the State of Nevada. He is the inventor of the iron pan process for working silver ores, and which was known on the start as the Washoe pan process, now used all over the mining world, and is the inventor of much machinery for mining. He mined on the Comstock for five years, then sold out and engaged in the banking business at Gold Hill, and remained in this until he sold out to the Bank of California, then managed by Wm. Sharon. Since 1878 he has been a resident of California, mining in its various localities. From first to last he has been a writer as well as worker, and is the oldest contributor to the MINING AND SCIENTIFIC PRESS. Mr. Paul says: "My earnest desire has always been to build mining up by improvements and have always been an active operator and have no cowardly dollars ever on hand."

Beginning of Quartz Mining in California.

From 1848 to Discovery of the Comstock.

Written for the MINING AND SCIENTIFIC PRESS.

Gold being so abundant in all the rivers and mountain gulches of California in 1848-'49 and it requiring merely physical labor to become possessed of it, but little attention was paid to the ascertaining from whence the gold came. However, soon the investigator began to survey the surroundings, and discovering quartz "in place," which the more scientific miner knew to be the matrix of gold, it then awakened the possibility of great riches by mining the quartz for gold. Then came also the question as to the most suitable machinery for extracting the metal. The first idea of course, after getting the quartz out, was to crush it down finer, and the next, to wash the material through sluices and the gold, through its gravity, would take care of itself, provided riffles were put in the sluices. These were the crude ideas of the beginning, and in time they were put into action. As to date of erection of the first mill for reducing quartz there is some uncertainty. It is claimed a small engine and machinery were taken to Mariposa county early in 1849 for Col. Fremont; if so, the "machinery" must have been an arrastra, or a "Chili mill." This claim, to hold good, wants to be better established than it is. In 1850 machinery for a mill was landed at the town of Mariposa, Mariposa county. The superintendent of this was John Burnett. This mill consisted of two or four Stockton batteries. The Stockton battery was a single stamp in a single mortar, in weight about 300 pounds, each mortar being independent, each having an opening behind for the feed and a small opening in front for screens and discharge. This claim I regard as correct, and was, strictly speaking, the first quartz mill of California.

Early in 1850 quartz mining began to attract attention, as many rich deposits of gold were found "in place," especially in Mariposa and Nevada counties, and about Grass Valley, in the latter county, many veins were prospected. To have a vein of quartz carrying gold was for a time considered more certain for permanent wealth than river diggings, hence the interest.

About September, 1850, a very rich gold-in-quartz find was made at Grass Valley, Nevada county, from which $20,000 was pounded out in a mortar. Grass Valley and Nevada, in consequence of the discovery of so many gold-bearing veins, soon took prominence, and about January, 1851, W. J. Wright built a small 4-stamp wooden stem mill, which was run by water power. About the same time Stanford, Fisk & Co. built a similar mill on the Cosumnes. It was at this early day, and at this mill, that was first conceived the idea of the revolving stamp which in these after years has played so important a part. Before July of 1851 some four or five mills were projected, notably those of Crossett & Co., Winchester, Chapin & Co., and Skinner & Rivett. The latter mill was erected at Gold Flat, about half-way between Grass Valley and Nevada. If my memory serves me rightly, all except the latter mill had square wooden stamps, with simply riffled wooden sluices for catching the gold.

In the fall of 1851, I became interested in the Skinner & Rivert mill. It had at first two Stockton batteries, already described. These soon proved impracticable for working any quantity of ore, and were replaced by an "up to date" stamp and mortar. In explaining this mill it explains the best mills as then constructed in California.

For a foundation, several sets of heavy timbers, alternately placed, horizontally, were put in, and on top of these was fastened the horizontal mortar timber; into this timber was inserted the cross mortar bed, also the side posts. The iron mortar, see Fig. 1, was simply a piece of iron 18 or 20 inches wide

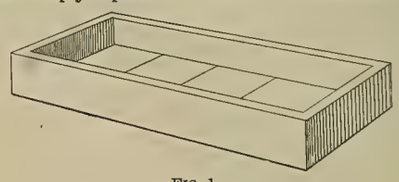


FIG. 1.

and from 42 to 48 inches long, and say 12 inches deep, according to size and number of stamps to be used. The usual size being for four stamps. Mortar and posts being in place, a wooden casing was made, having openings for feeding, and on front an opening for the screen. This casing was lined with the heaviest sheet iron obtainable. The stems were made generally of oak, squared to 8x8, and from 9 to 10 feet long. The shoes were square, also, and of same size as stem. The shoe end of stem was banded with iron. These oak stems had two ways of being lifted by the cam—one by a projection and the other by a slot in the stem, as shown by Figs. 2 and 3.



FIG. 2.

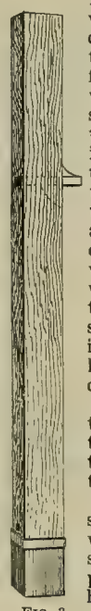


FIG. 3.

The cams for these stems were after the fashion of cut, Fig. 4, and were anything but symmetrical, yet filled the desire of the time, which was to give the stamps a lift of from 10 to 12 inches, stamps making only twenty-five to thirty-five drops per minute, height of drop at the time being considered more advantageous than less drop and more speed. The weight of stem and shoe was oftener 550 pounds than over. The square shoe, usually made of soft iron, soon wore into all kinds of shapes, as the cuts cuts illustrate. (See Fig. 5)

As the advantage of getting hard iron increased, this trouble decreased, still the wear, though less, was the same.

In this early period, screens for the battery were made of common sheet iron, the holes being punched at random by home-made punches or the sharp end of a file. All feeding and breaking up of the quartz was done by hand. Some mill-men used quicksilver in the battery, but usually they did not.

The pulp from the screens flowed on a wooden

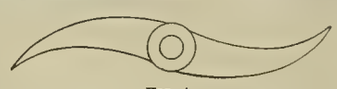


FIG. 4.

platform, having wooden riffles, and from this into sluices made of 12 or 14-inch boards, these having also riffles every little ditance.

Among the pioneer miners were many from Mexico, who were familiar with making and working the Mexican stone arrastra. Of these many were made,



FIG. 5.

generally in size from 8 to 10 feet in diameter. These were run by mule or horse power. There were more of these arrastras in the southern than in the northern mines. They were very popular and profitable machines.

As time passed new machinery as gold-savers came on; among them was the German skaking table, and the use of blankets in sluices, which were washed by hand and was a laborious duty.

So crude was our knowledge and working at this period, and even up to 1853, that now, looking through the telescope of near fifty years, I see, com-

paratively speaking, we simply knew nothing of the the real science of gold extraction, and yet we knew about as much as the rest of the mining world, and no one can more clearly appreciate the advanced present than myself. In these earlier days gold of the size of small pinheads we hardly expected to save, and so limited was the capacity of mills and the percentage of values saved, together with the heavy expense for working the mines and milling the ores (miners' wages being $6 and $8, engineers $10, general hand from $4 to $5 a day, with everything else in proportion), that $20-per-ton ore on the average would not more than pay the expenses, and I now see it took ore having a full value of $100 per ton at least to even pay expenses, as not over 20 per cent of the value on the average was extracted. Thousands of tons were worked that paid over $100 per ton. The writer washed hundreds of tons in the crude way of the time averaging from $100 to $300 per ton, and here I will say the $25 ore was decidedly "low grade."

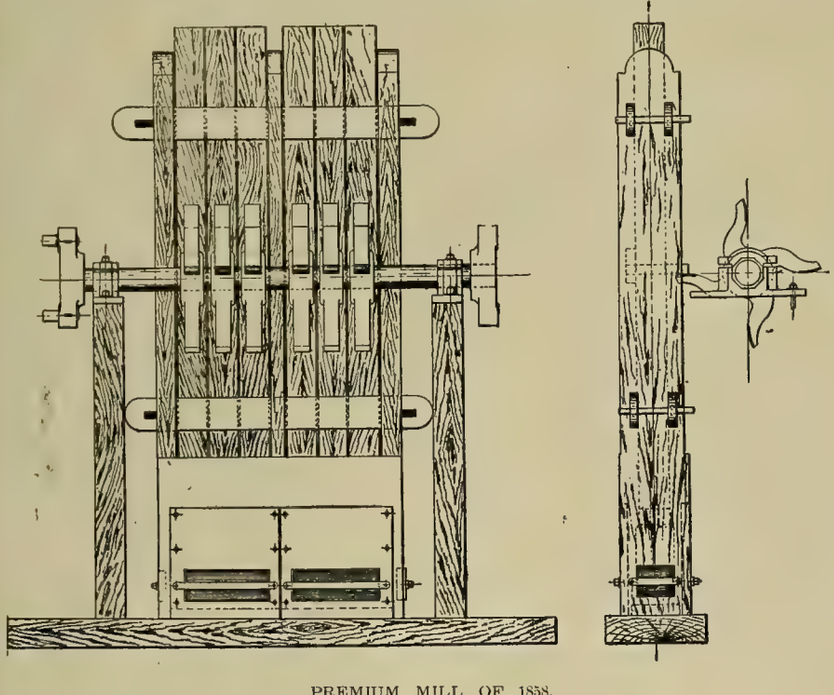
Grass Valley and Nevada were virgin fields, as were all the other quartz sections, and thus only the richest ores were milled. That there was a wastage of gold all supposed, and new devices soon appeared for saving it, and yet but few miners really comprehended the actual loss as now gold extraction is understood. The richness of the sulphurets was known to the assayers and a few others, but how to profitably handle them was the question.

About 1853 copper plates coated with mercury began to be used to a limited extent, and as time passed the more popular they became. Plating copper with silver was not thought of until after discovery of the Comstock. For concentrating the sulphurets and finer gold blankets held their own, yet different devices came to the front, and among them the Bradford separator, which was a most excellent machine except that it required too many to do any amount of work. Chili mills were soon introduced; also stone arrastras for working the blanket washings, the latter proving very practical and profitable. Among the profitable mills of the earlier days was the Allison Ranch of Grass Valley. This mill had only stamps and blankets, and long sluices of the latter. It was quite a sight to see one of their "clean-ups." All the upper blanket washings were "panned out," and it was no unusual thing to have $500 in each pan, all bright gold, they using no quicksilver in their battery.

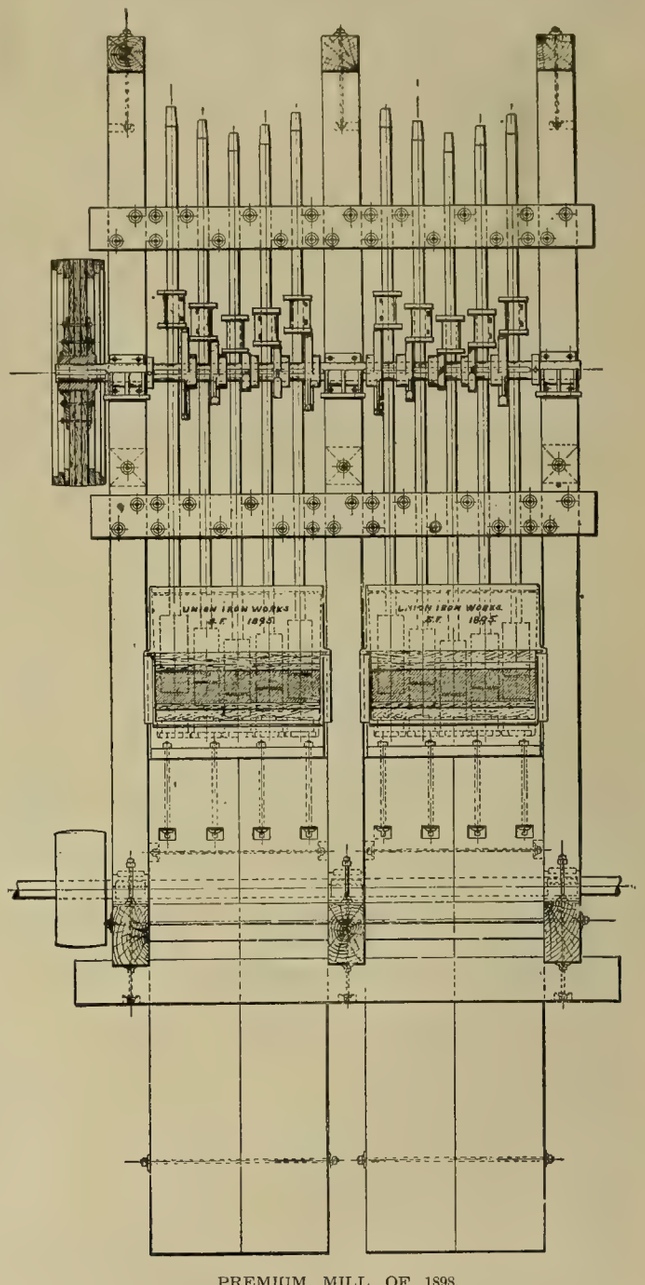
By 1855 there was a great advance, not only in the number of mills but in styles. The mortar and stamp as described gave way to a higher one, high enough to take in the feed and screen frames, some being made for four and others for five stamps. About this time several styles of iron batteries were introduced, as there was a general desire to get rid of the clumsy wooden stamp stem, leaky encasement and square stamp. Among these iron batteries was the W. H. Howland circular, which had round iron stems, and to operate it the stamp had to revolve; and as far as my memory goes, this was the first practical revolving stamp mill—yet to Mr. Isaac Fisk is due the conceiving of the revolving stamp. Another iron mill was brought out having two square iron rods as stems set into the bosses of the shoes, the two rods being separated wide enough for the cams to ply between and onto a tapit or bonding lift bar. The several styles began to suggest new features for the regular line battery. Cornish rolls, English buddles and jigs, all had their trials, giving but little satisfaction. Blankets in sluices, copper plates and the arrastra, all held their own.

About 1855 C. P. Stanford introduced his self-feeding device, and this marks the first step forward in this line; yet it was several years before there was any special interest taken in using it. Stanford's first patent possessed the vital feature of every self-feeder since introduced—the lever operated by the tappit.

The first parties in California to branch out from the "practical" into the scientific field for extracting gold from the sulphurets were G. J. Ott and companion, F. Besselen of Nevada City, both expert metallurgists and assayers, who spent considerable time and money in operating the chlorine process, which at this time was in its more crude state. These parties erected at Grass Valley in 1858 a small reverberatory furnace, and many tons of sulphurets were worked as concentrates by the blankets and various other devices. This chlorination plant proved a success in point of per cent of the precious metals saved, the average working being up to 88 per cent of the value, but furnace being small, the capacity for work was quite limited. Their charge for working was $50 per ton. From 1855 to 1858 there was a general feeling that in a few years the quartz gold interest would expand into an immense and valuable industry, and, to advance it, in 1858 the directors of the State Fair appointed a commission to examine and report on the best mill of the State, offering a premium for same. The premium was awarded to the Agua Fria G. M. Co., generally known as the "Gold Hill mill," of Grass Valley, of which my esteemed friend, Mr. Melville Atwood, was the general manager. This mill had twenty stamps and was the largest of the time. All the iron work was sent out from England, and was the best the English then knew, and that the general reader may comprehend the advance, I here present the premium mill of 1858 and the premium one of 1898.



PREMIUM MILL OF 1858.



PREMIUM MILL OF 1898.

At this date quartz mining in California was in a very flourishing condition. There was plenty of profitable ore, and a general good feeling for the pursuit prevailed all over the mining sections of the State. Capital for sensible investments was easily obtained, but soon a disturbing feature presented itself, and this was the discovery of the Comstock in the winter of 1858. The fabulous tales of the riches of "a lode that could be traced for five miles, having plenty of ore that would go $1000 a ton" (all of which proved true), caused in the spring of 1860 a general stampede of the mining men of California, very many leaving valuable interests behind them, and among these was your humble servant.

What California lost by this exodus the Comstock gained, for there the men of enterprise and experience rushed, carrying with them the spirit that prosperity in California mining had infused. Capital also changed its locality for mining investments. Thus the opening of 1860 seriously affected the quartz mining interest of California, and this date I now set as the closing one of this article. To further illustrate how California was affected, I will add that the difference between her gold production in the succeeding three years, as compared with the three years preceding the discovery of the Comstock, was $26,000,000. And here it is well to say that 1860—on the Comstock—opened the greatest and grandest mining period of all the ages.

The great advance made then and in after years was not local only, and in California to-day, and all over the mining world, can be seen the bold and progressive idea of the intelligent operators on the Comstock. And here I am prepared to say that from 1860 to 1890, a period of thirty years, greater progress was made in all that tended to advance mining in its many departments than had been made in the preceding 500 years. I admit this is hard to realize, but if you doubt it work up the past as I have, then analyze the metallurgical, mechanical and electrical advances of this latter period, and you will not only admit it, but feel proud that you lived in an age of such wonderful progress.

ALMARIN B. PAUL.

San Francisco, Cal., January, 1898.

PROBABLY the earliest record of a stamp mill is found in Agricola, published in 1556. He tells of one built in the Hartz mountains in 1529, and gives a picture of it. It shows great wooden stems, 8 inches square, raised by projecting pins from a revolving shaft. He tells us that the stamp heads were of quartzite or iron. The mortar was a trough with a stone bottom. The power was furnished by an overshot wheel. Even up to 1856 the wooden stem was still in use, and it was said that iron stems could not be used because the jar would break them. The old straight cam, scarcely any different from the straight pin of Agricola's day, was in use until displaced by California methods, as told elsewhere in this issue.

Gold Formations in California.

Written for the MINING AND SCIENTIFIC PRESS.

"California!" What a halo of golden glory surrounds the mystic word. For fifty years it has been the synonym of success, of gold, of happiness—but never of idleness. A land whose valleys are bathed in perpetual sunshine; whose lofty mountains are crowned with eternal snows; where climatic conditions are perfect, and where "digging for gold" is a pastime.

More than thirteen hundred millions of dollars in gold from California's mines—conceive, if you can, this vast glittering pile of wealth. Nowhere else on earth has gold been distributed in such abundance, and nowhere else has it been so easily obtainable.

What more happy sequence of geological events can be imagined than those which made this possible. It would seem that kind nature had almost surpassed itself in creating for mankind so beautiful a land, where gold might be had in abundance for little more than the asking. A delightful climate, never failing rivers of pure water, vast forests of timber—a miner's paradise.

How the Sierra Nevada was Formed.—Conceive a broad area of sediments—shales, sandstones and limestones—lying under the ocean's bed, in nearly horizontal sheets. These appear to have been uplifted, contorted and crushed by the intrusion of vast masses of basic eruptive rocks, chiefly diabase and diorite. It is not unlikely that the serpentines, which form quite an important feature of the geology of the gold belt, were also erupted at this time, or shortly thereafter. It is probable that this period of disturbance and the eruption of these dark, basic rocks continued for some time.

Subsequent to this, occurred the intrusion of those enormous masses of granite (grano diorite) which for most part make up the great Sierra Nevada range, famous throughout the world for its grandeur and picturesque beauty.

Whether the introduction of the granite was violent or whether it was a slow process, requiring ages to complete, is a question upon which all do not agree; but there seems to be sufficient evidence at many places along the contact of the granite with older rocks, both sedimentary and eruptive, that it was accompanied by tremendous crushing and folding, and an uplift of most violent character, and it is the belief of the writer that it was to this irresistible force that the shearing of the greenstones is due, which later resulted in the alteration of large areas into what are now termed amphibolite schists—a term employed to designate all of those rocks altered from massive diabase and diorite into chloritic and talcose rocks. The sedimentary rocks also shared in this process of alteration from the same cause, and we now find in place of sandstones, shales and limestones, quartzites, clay and magnesian slates, and crystalline limestone (marble) with many intermediate stages of alteration, such, for instance, as micaceous sandstone and mica schist, mica slate, and, often near granite, gneissoid rocks. We also find calcareous sandstones and silicious shaly or slaty rocks.

Formation of the Great Fissure System.—The intrusion of the granites was followed by much shifting, uplift and subsidence of the region. This movement of the great rock masses resulted in the formation of vast fissure systems extending for hundreds of miles in a direction approximately paralleling the crest of the Sierras. These fissures also extended into the granite itself. It is quite possible that the contraction of the molten granite on cooling was a very important factor, the shrinkage resulting in forming many crevices, some of which were doubtless filled with later-dike rocks of coarser crystallization, but also of granitic type, such as are so commonly found in the granite region.

The fissures were great rents, as it were, in the rocks, extending to unknown but certainly very great depth. These fissures were not necessarily all open spaces, though doubtless some were. They were fractures which extended often great distances, running in a general direction, though having a more or less sinuous course, a varying angle of dip and many branches. These fissures were lines of weakness, and as the movement of the great rock masses continued the rocks slipped upon these planes backward and forward, up and down, sometimes in one direction and as often in another. In many veins the striations and polished rock faces indicate the direction of movement, which is almost always found to be obliquely along the strike (course) of the vein. Not infrequently two or more series of striations or grooves may be observed, each in a different direction, indicating clearly that the movement has not been confined to a single direction. It is thought by many that striations on the walls indicate the direction of the pay shoot. Frequently they do, but not always; though where the contrary is the case any original striations conforming to the pitch of the ore shoot may have been entirely destroyed by subsequent movement in some other direction.

Normal and Reverse Faults.—The law of normal fault—that is, that the hanging-wall side of the fissure sinks relatively to the foot wall—does not always obtain, for it is as often found that the hanging-wall side has been forced upward, and we then find the "thrust" type or reverse fault. As far as my personal observation has extended the latter type of displacement is by far the more frequent in California.

This tremendous movement of rock masses upon each other must have continued for a very long period, and the movements may still be in progress. As a result of these movements we find the rocks along the fissures crushed and often pulverized, forming what are termed gouges of clay-like material. It is not difficult to fancy the result of any change in the direction of either the strike or dip of a fissure. Had the fissures been perfectly true planes, having a straight strike and uniform dip, it is scarcely likely that we would have found such great width of vein material—often upwards of 100 feet in width and sometimes greater. Not infrequently we find a series of nearly or quite parallel fissures, forming a zone of crushed and pulverized rock all more or less altered from their original condition.

The Creation of Gold Veins.—It has been stated that these fractures extend to profound depths, reaching doubtless thousands of feet, in many cases, into the earth. Along these fissures arose waters, probably hot and bearing in solution abundance of silica with base metals, chiefly iron, copper, lead, zinc, antimony and arsenic, together with gold and silver, and also a most prominent and important element, sulphur. The fissures formed channels along which these hot mineral-bearing solutions might readily pass. As they ascended, penetrating every crevice, crack and space of discision, and often even the rock walls themselves, the super-laden solutions precipitated their mineral contents. Much of the crushed and pulverized rock mass was removed by the dissolution of the soluble portions, and silica, metallic sulphides, silver and gold deposited atom by atom in their stead, the material dissolved being carried away in solution by the ascending waters, or redeposited in the form of new compounds—carbonates and silicates—forming a portion of the mineral vein itself. We find in many veins an abundance of calcite and magnesian material, derived in all probability from the alteration of the original rock mass in which the fissure occurs.

It is undoubtedly this process, continued through ages, that resulted in the formation of these, the richest gold-bearing veins the world has ever known.

The Great Dolmitic Vein.—That portion of the gold belt known as the "mother lode," extending from the southern part of Mariposa county to Carson Hill in Calaveras county, and characterized by its enormous outcrops, in some places extending for miles in an unbroken line, consisting largely of dolmitic material and mariposite, I believe to have been originally a great dike, now changed by the same processes which altered the other rocks, the great veins, lenses and masses of quartz included in it having been formed in the same manner as quartz in veins elsewhere, the silica having replaced the dolomitic material in part, though no doubt some of the quartz was formed in open fissures or cavities, as is indicated by the beautiful, well-formed quartz crystals frequently found in these masses.

Formation of Ancient River Gravels.—What may have been the topography of the region of the gold belt in that early period we can only fancy. Undoubtedly it consisted, as to-day, of elevations and depressions. There is every indication that the rainfall was much more abundant then than now, and many of the streams were large. Erosive forces are always at work and have been since the world began. As soon as a rock mass is elevated above the level of the sea its destruction commences at once.

The great gold veins required a long time, no doubt, for their formation, but the work of degradation was also in progress at the same time. The creeks united to form rivers and the waters flowed on to the sea, just as they do now, and they carried along the silt, sand and gravel derived from the decay and wearing down of the hills. Floods were probably not of infrequent occurrence, as may be easily imagined when considering the enormous size of some of the boulders found in some of the ancient river channels. Ice may also have performed an important part in the transportation of the vast amount of material forming these old river beds.

Source of the Gold of the Ancient Rivers.—Most of the larger rivers of that age had their source well up in the Sierras, and it is an important fact that they are gold-bearing as far as they have been traced and investigated. Here is an important fact which appears to have been overlooked. The gold found in the gravels of these ancient rivers was largely derived from a region far to the eastward of the recognized limits of the gold belt. Take for instance Placer county, famous for its great drift and hydraulic mines, which have produced hundreds of millions in gold. From what source was this gold derived? Certainly not from the gold belt, but from a region east of it, in the high Sierra itself. Although this particular region—eastern Placer county—is covered to a great extent by hundreds and in places thousands of feet of andesite tuff, there remains no doubt in the mind of the writer that the gold veins from which the vast amount of wealth found in the gravels of Iowa Hill and Forest Hill divide are in the crystalline rocks underlying the lava rocks. The high Sierra has not been closely investigated for gold veins, the general impression being that there are no veins there. There is no evidence to substantiate this idea, while on the other hand there is every reason to believe that there is a gold belt in that high snow-covered region. Altitude is not a factor in the case at all. The most of Colorado's great gold mines are at altitudes of 10,000 feet or more above the sea.

Although for fifty years the State has been searched "high and low," but mostly low, for gold, every day brings to light new evidence that we have only a superficial knowledge of our great mineral resources.

Croppings Not the Original Surface.—The surface exposures of our mineral veins called "croppings," it must be remembered, do not represent the original surface. These croppings were at one time deep down in the rocks, hundreds and even thousands of feet, and these surface exposures were formed in precisely the same manner as those portions now being exploited in our deepest mines. The amount of erosion generally has been enormous. A study of the ancient river channels will convince any one of this. Since the age when these old river beds were formed the recent streams have cut their way down through the lava caps, and hundreds, and in some cases 2000 feet into the hard underlying rocks, as is the case in the canyons of the American river; and there is reason to believe that these ancient rivers also at one time flowed through canyons whose walls were, perhaps, just as high. All over the region of the gold belt thousands of feet of solid rock, with the enclosed gold-bearing veins, have been eroded and the material swept off into the valleys of the great interior basin.

There are those, no doubt, whom it would be difficult to convince of this important fact, for we are all too much inclined to measure the great forces of nature by what may be within the power of human agency to accomplish, and to measure time by the brief experiences of our life. It is impossible for the human mind to comprehend the immensity of a single geologic age.

A Popular Fallacy.—There are some fallacies quite popular among miners. These peculiar theories are not usually based upon sound reasoning, nor upon facts demonstrated by fifty years of mine development in California, nor by the experience of centuries of vein mining in any other portion of the world. How often we hear it said in the case of a somewhat discouraging prospect at or near the surface, "Oh, this is only at the surface; when depth is attained this will prove to be a rich mine!" And who shall presume to dispute this statement? As pointed out above, the "croppings" of to-day are not at nor, in most cases, anywhere near the original surface. There are many practical evidences among our mines that prospects, poor at the surface, in depth proved great and valuable mines. There are also as many others where mines, rich at and near the surface, proved poor and unremunerative a few hundred feet below. Still, this does not prove that further development at greater depth will prove unprofitable. I have in mind several mines in which the veins at and near the surface proved poor, small and low grade, but in the lower levels to-day we find immense ore bodies, rich in gold and paying handsomely. On the other hand I have knowledge of five great mines which together yielded nearly $20,000,000. Of these three are now idle; one of them is 600 feet deep, one 800 feet and the third about 900 feet. The other two, after years of idleness, have resumed operations and are to-day among the leading mines of the State. No one familiar with the three idle mines mentioned would be willing to admit that their values are exhausted. These five mines are cited simply as examples, for there are many others now idle where there is every reason to anticipate that a resumption of operations would prove entirely satisfactory. Most of the new mines now coming into prominence are old mines, shut down years ago, recently reopened with every indication of success.

Permanency of Our Mines.—It has been shown that from the nature of the origin of California gold veins the fissures must extend to great depth. It is an important question asked by the intending investor, "To what depth will vein mining pay?" The deepest mines in the State show no depreciation in the average value of the ore, and there is at present no reason to believe that the gold values per ton will be found to decrease with increasingly greater depth. The depth, then, to which mining may be carried on profitably in California is only limited to that point where the cost of production entirely absorbs the output, and the possibilities in that direction are yearly growing greater through the agency of improvement in machinery and mining methods as well as in the treatment of the ores.

Behind the Times.—What California most needs is to shake off—not the spirit but the methods of '49.

It is a fact that although we have had the most prolific gold field the world ever knew, and our resources are still almost boundless, we are ridiculously behind the times, in many of our methods What we mostly require now is new capital and a class of more energetic men; more enterprise, more railroads, newer methods of mining, and in some instances the introduction of metallurgical processes now in successful operation elsewhere.

The comparison may seem insidious, but if California would imbibe some of the spirit of Colorado, South Dakota, Michigan or Montana we would accomplish a success which would place this State at the very front of the gold-producing regions of the world.

New Capital Required.—It may seem strange to the Eastern investor that we should say that California requires outside capital. "Has not California scores of wealthy men, many of whom are millionaires?" they ask. It is true we labor under this disadvantage. We have quite a large number of *retired* millionaires. We also have a much larger number of wealthy men, not classed among the millionaires, whose fortunes are still very large, and many of them made their fortunes in California's mines, but only a few of these gentlemen are to-day in the active field of mining. Their fortunes are invested in real estate, mortgages, bonds and other securities, and they are now living in ease, with few business cares to annoy them, and these men will not again enter the field of mining nor invest in mines. Then there were those who accumulated great fortunes who are gone, leaving the inheritance to their sons and daughters, and these know absolutely nothing of mines or mining, and they have not the least desire to become acquainted with it in any form whatever—not even as investors.

Such being the case, we naturally look outside our State to the great financial centers of the East, and even to Europe, for capital to invest in our mines, knowing that intelligent investment will in most cases result in success.

Modern Appliances and Methods.—It must be said candidly that the best engineered and most thoroughly equipped enterprises, as a rule, are found in the hands of Eastern or foreign investors. This is not without a generally beneficial effect, for these new enterprises are demonstrating that they are able to accomplish, with their superior plants and scientific methods, greater results at less cost than where the old time ideas are still followed; and Californians, already seeing these advantages, are beginning to adopt these "up to date" ideas. The past three years has seen great strides toward improvement in this direction. A better class of machinery is being installed, and more methodical, far-seeing plans of development and exploitation are being adopted.

Electricity and compressed air are finding a wider field of usefulness, and more attention is being given the metallurgical branch than formerly. Ordinarily, however, California gold ores give very little trouble, and are successfully treated at as low a cost as anywhere else in the world. Some few districts, however, still have problems in this direction to solve, but appear in even these isolated cases to be upon the verge of success.

W. H. STORMS.

A RECENT visitor to Rhodesia, describing in the *Contemporary Review* the gold mines of that region, mentions one more particularly in the Gwanda district, which has been re-discovered by a Mr. Andrew Nicholson, and has received the name of Geelong. So much confidence is felt in its richness that £100,000 is being spent, under the direction of experts, in its development. But what is chiefly remarkable about it is that in sinking the shafts the men employed came upon very extensive old workings. In fact, the whole hill seemed to have been tunnelled at some remote epoch. In the course of their excavations they reached a "timbered chamber, 500 yards long, containing vast quantities of rich quartz, ready broken down from the reef, partly burnt, and ready for the battery. The timber was still in this mine, and large numbers of diorite hammers were found. This discovery proves that the ancients knew how to treat the quartz with fire when they could not otherwise break it small enough to get the gold out." But why should operations have been suddenly suspended in these rich reefs? And why should they have been deserted by the miners, who seem to have left their tools behind them? The writer answers these questions thus: "The conjecture is that they were the same people who built what are now the ruins at Zimbabive, probably some thousands of years ago. Some accident, some plague, wet, or other catastrophe, would seem to have come and swept them all away; and for centuries those reefs have been awaiting a new discoverer. What is true of this mine is, no doubt, in a measure true of a great many others, for the country is covered with these ancient workings." At Tebewke there are old workings on a reef which have been traced along the surface for a distance of 2500 feet; and trees were found growing from bottom of shafts at least 100 years old. So far as recent sinkings have gone, they have proved that the reefs descend to a much greater depth than the levels at which they were being worked at the time those primeval operations were so mysteriously arrested.

The Correct Date of Marshall's Discovery.

In connection with the present golden jubilee, commemorating the fiftieth anniversary of the discovery of gold in California by J. W. Marshall, it is incumbent that the exact historical facts be given. It is now generally published that such discovery was made January 24th, 1848. That is not correct. The date of the discovery was January 19th, 1848. This matter came up in September, 1884, when the statement was published that the date was January 18th. Marshall was then visiting San Francisco, and in an interview with the editor of the MINING AND SCIENTIFIC PRESS stated with much detail and faithfulness that January 19th was the correct date. That settled the question for the time.

About ten years ago there was brought to light and published in this city a diary, or portions of a diary, kept by Henry W. Bigler, one of the men employed on the Sutter sawmill at the time of Marshall's gold discovery. In this diary occurs an entry which purports to have been made on the day that discovery took place, but which conflicts with the heretofore accepted date of that event, which, according to Marshall, Sutter and others, who certainly ought to know, occurred on the 19th day of January, 1848. According to the entry in Bigler's diary, it occurred on the 24th day of that month.

As there seems to be a present disposition to adopt this latter as the true date of the gold discovery, it may not be amiss to examine a little and see what, if anything, there may be to justify such change in the chronology of that notable occurrence.

According to Marshall and Weimer's version of the discovery, they two were, on the morning of January 19th, 1848, walking down the millrace to see what execution the water let in the preceeding night for the purpose of deepening the channel had effected. Marshall, being a little ahead, was the first to espy a piece of yellow metal lying on the side of the race, which, picking up, he and his companion, after a careful examination, came to the conclusion was gold. Searching further and finding more of this metal, they resolved they would keep the discovery a secret long enough at least to enable them to get in a stock of saw logs, the mill itself being then about completed. They knew, as subsequently happened, that if the secret got out the men in their employ would at once quit work and go to gold-digging, thereby putting an end to all log-hauling and lumber-making, notwithstanding the latter was so much needed at the fort.

Adhering to this resolution, both Marshall and Weimer assure us that they kept the gold find a profound secret for several days after it happened, having succeeded meantime in getting a supply of logs cut and hauled to the mill. This accomplished, they let the secret out; that it so say, having kept it to themselves until the 24th of the month, they then gave it publicity, and the fact coming to the ears of Bigler he, as was his wont when anything noteworthy happened, jotted it down in his diary, the entry running thus: "January 24th—This day some kind of metal that looks like gold was found in the tail race." Now, clearly Bigler could not have made that entry on the day the gold was found. To suppose that he did would be to presume that Marshall and Weimer rushed off at once and not only acquainted Bigler with the fact, but took along a quantity of the yellow metal for his inspection, which would be to gainsay reason and discredit all that these men have told up about the circumstances attending the gold discovery.

That Bigler did not at the time attach much importance to the reputed gold find is evident from the fact that there appears no further entry in his diary until January 30th, when the following remark occurs: "Our metal has been tried and proved to be gold. It is thought to be rich." For nearly a week after the discovery, adopting his own chronology, he continues working in and about the mill, paying so little attention to it that only after the expiration of six entire days does he find out that the metal is actually gold.

The discrepancy between these dates is easily explained. Marshall gives us, as he had every reason to do, the veritable day on which the discovery took place; Bigler the day on which he first heard of it, under the impression, probably, that it was really the day on which the event happened, or he might have worded the entry in the manner he did through inadvertence. Nor is it on the testimony of Marshall alone that this version of the ever memorable incident rests. It is confirmed by the statement of Peter L. Weimer, Mrs. Weimer, his wife, and all the hands at the mill, other than Bigler, and even by that of General Sutter himself, who could by no possibility have been mistaken on this point. To suppose that all these people, who had the best opportunity to know whereof they speak, and the best reasons for speaking correctly, should have been mistaken, or that they conspired to testify falsely, is out of the question.

True, it may be said: "This is but a minor matter; what is the difference whether it was the 19th or 24th?" Very little, in one sense, as to the results, but in all such matters it is better to be exact, and in this case it is as easy to be right as to be wrong. The magnitude of the results of that discovery justifies exactness, and, hence, it is here clearly shown, and forever put on record, that the date of the discovery of gold in California by Marshall was January 19th, 1848.

Self Ignition.

Oxygen, one of the constituents of air, is necessary alike to explosion and combustion. When street gas, or kerosene oil vapor, or even very fine organic matter, such as flour, coal dust, etc., is intimately mixed with air in certain proportions and a spark of fire applied, there will be an explosion like that of gunpowder. But the oxygen is as necessary as the spark of fire. Plunge a lighted candle into a gasometer of pure street gas and the effect will be the same as if it had been dropped into water. Liquid kerosene oil never explodes, and when the "lamp explodes" it is the oil vapor and air mixed above the oil that causes the mischief. A few years ago we read of a man who was repairing a gasometer lowering a light into the manhole just at the wrong time, namely, while there was still a little gas remaining, and the entire apparatus was blown up. Had it been full of gas alone he might safely have lowered his light into the place. Furnaces using coal-dust fuel would go out should the supply of air be shut off.

Prof. Pepper's interesting experiment along this line is worth giving in this connection. Take a box a foot square and containing a quart or two of fine flour, and nail thereon, for a cover, a fine wire netting, like bolting cloth, used by millers. Now shake this box at some open flame, like a burning stick, and in such a way as to send out a cloud of dust upon the flame. If the conditions are all right, there will be instantly formed an astonishing volume of flame resembling the flame from the burning of an open bunch of gunpowder. The flour, being largely carbon, will burn when mixed with air, about as readily as the coal dust in a furnace, or as the fine particles of coal floating in the air in coal mine explosions, to which most of the violence of coal mine explosions is now believed to be due. A pile of flour is harmless enough, but surround each of its particles with oxygen and apply a spark of fire, and the result will be an explosion. It is, therefore, always dangerous to go about a flour mill with a light of any kind.

Gunpowder is a mixture of carbon and oxygen in solid form, as seen from its ingredients, charcoal and saltpeter, the one supplying the carbon, the other the oxygen. Take out the saltpeter, and a harmless mass is left. In kerosene vapor we have an example of a still finer form of carbon, but in chemical combination, and in illuminating gas and air, an explosive mixture where the ingredients are both perfectly gaseous. A coarse mixture is comparatively harmless because of the difficulty of combining in burning. The form of the mixture, whether solid or gaseous, is immaterial, but the two elements, oxygen and carbon, are essential. True, other combustibles than carbon may be combined with oxygen to form an explosive material. Street gas is, in fact, partly hydrogen. There are a few other substances that will partially take the place of hydrogen, but they are usually experimented with in chemical laboratories, and need not be dwelt upon here.

Prof. Tobin demonstrates by experiments that dampness destroys the explosive tendency of fine organic dust, and he recommends that millers use the wet-bulb thermometer constantly in their mills, and on its indication of dryness to inject live steam into the atmosphere. And Prof. Baehr, of Dresden, has found that the leather belts used for the transmission of energy in mills are such rapid generators of electricity that finely divided forms of dust may be exploded thereby. Many fires have their source in self ignition. A package of lampblack has been known to ignite spontaneously and fire a building. Oily or greasy waste and rags have been seen to blaze up a few minutes after having been thrown on the floor. Dry rubbish exposed to the sun has been seen to take fire under circumstances which precluded any other possible cause. Sawdust around oily machinery journals has taken fire. Hay, heating in the mows, has taken fire and burned down many a barn.

Steam pipes will char wood touching them and fire will result. Hot-air pipes are equally dangerous in contact with wood. Ships that have a cargo of damp goods stowed away, such, for instance, as cotton in bales, are liable to be burned, for spontaneous combustion occurs just as well where dampness is as where only grease or oil is present. This is the reason why hay or grain stowed away while wet, or bales of rags or even heaps of bituminous coal, have taken fire spontaneously. Barrels of damp sawdust, often seen around certain factories, are always liable to cause a fire. Even moistened tin-turnings and chips have been known to take fire.

Recollections of California Mining Life.

Written for the MINING AND SCIENTIFIC PRESS.



ALTHOUGH THE grand discovery of gold in California occurred not until 1848, there were traditions of its existence here centuries before that time. For nearly 300 years the impression that this was a gold-bearing country obtained among both English, French and Spanish-speaking peoples, being founded on the reports of navigators along the North Pacific coast, magnified, as was their wont, by the chroniclers of these early times. In the summer of 1579 Sir Francis Drake, the English navigator, entered the bay which now bears his name, and anchoring his vessel remained there several weeks. Before departing he took possession of the country in the name of his sovereign, Queen Elizabeth, and called it New Albion. On his return to England, with a view probably to give importance to his new possessions, Drake represented the country as abounding in gold, so much so that Hakluyt, the historian, in speaking of it declares that "there is no part of the earth here to be taken up wherein there is not a reasonable quantity of gold or silver." Inasmuch as there is no gold or silver anywhere about Drake's Bay, which lies in latitude 38°, and thirty miles north of the Golden Gate, the above statement is clearly a fabrication of the great navigator. Had Sir Francis went ashore a hundred or two hundred miles farther north, where the gold bluffs and beaches occur, there might have been some ground for the representation so made. But as the bay called after him is as far as he voyaged in that direction, the existence of these auriferous deposits avails not to save his veracity from successful impeachment.

But this notion about gold in California did not originate with Drake and his contemporary historian. In the same year that he visited this coast a book was published at Lorraine, in which occurs the following passage: "The soldiers of Vasquirus Coronatus having found no gold in Vivola, in order not to return to Mexico without gold, resolved to come to Quivera (California), for they had heard much of its gold mines, and that Tatarraxus, the powerful King of that country, was amply provided with riches."



SCENE OF MARSHALL'S GOLD DISCOVERY.

After the conquest of Mexico the Spaniards, incited by the vague stories told them by the natives of the country, were ever engaging in expeditions off this way in search of the precious metals. And when these adventurers arrived in Arizona, here again the inhabitants gave them to understand that the gold-producing lands they were so eager to find lay still farther to the northwest. In so advising their unwelcome visitors these people might themselves have believed what they said to be true, though possibly this was a ruse to induce these marauders to move on and thus rid the country of their presence. Between the years 1610 and 1660 more than twenty expeditions were sent out from Mexico to explore and occupy the regions to the northwest, under the impression that they abounded not only with gold and silver, but also with pearls, diamonds and other precious stones.

How signally these efforts failed of their object is denoted by the fact that prior to 1848 only a few placers, poor and of comparatively limited extent, were ever found in California; so unimportant, in fact, were these gold fields that not much was ever heard of them outside the country and very little in it. The first of these placers, which was discovered by the Mexicans as early as 1775, is situated near the Colorado river, in the extreme southeastern angle of the State. Fifty-three years later deposits of free gold were found at San Isidro, 100 miles farther west, in San Diego county. In 1833 some little gold was gathered in the valley of the Santa Clara river in the northwestern part of Los Angeles county. Five years later the San Francisquito placers, located in the Sierra San Fernando, at a point forty-five miles northwest from the Pueblo Los Angeles, were discovered. These, the most productive deposits yet met with, were afterwards worked in a small way for a period of twenty years or more. The deposits at the other places mentioned, owing to their poverty and a lack of water in the neighborhood, were never much worked. And thus it was that, with all these legends and reports about gold in California, the country prior to the discovery at Sutter's mill produced very little of that metal—not more, perhaps, than $40,000 or $50,000 worth, all told.



SUTTER'S MILL WHERE MARSHALL FIRST DISCOVERED GOLD.

As it has been surmised that the Mexican Government was not well informed as to the existence of gold in California at the time that it parted with the country under the treaty of Guadalupe Hidalgo, it may be pertinent to state here that such was not the fact. The late Gregory Yale, in preparing his well known work on the legal titles to mining claims and water rights in this State, being obliged to make extensive research among early Spanish archives, discovered there the following document, showing that

the Mexican authorities were at that time not only advised as to the existence of placer mines in California, but that the extent and importance of these deposits were greatly exaggerated by the party communicating the information. This document, which



WHERE MARSHALL DISCOVERED GOLD JAN. 19, 1848.

consisted of a letter addressed to the President of the Republic by Manuel Castanares, Representative in the National Congress from the Department of California, was published in the City of Mexico in 1845, though it bears the date of March 2, 1844, nearly four years before the Marshall-Sutter discovery of gold. The letter, translated for the above work by Charles G. Yale, reads as follows:

"The gold placers discovered in the course of last year have attracted the greatest attention, for they extend nearly thirty leagues. The good quality of this metal is made manifest by the certificate of its assay, which was made at the mint of this capital, and by the sample which I send to Your Excellency. In order to develop the great elements of wealth in which California abounds, measures ought to be taken only after mature deliberation. I therefore shall have the honor within a few days of presenting to Your Excellency a memorandum detailing these elements, and the means of developing them with very little sacrifice."

A few months later Representative Castanares addressed to the President of the Republic the following additional paper on the same subject:

"The mining interest in California is of great importance, and I have the satisfaction of assuring you that it forms one of the most valuable resources of that department. Besides the silver mines which are found there, and various other mines which have actually yielded metals, the gold placer, especially, is worthy of great attention, which, extending nearly thirty leagues, was discovered lately, together with mines of mineral coal. It is painful for me to have to confess that mining is in a worse state than agriculture; the latter is in its infancy; the former, it can be said, it is not yet born, notwithstanding that, according to the nearest estimate of reliable persons in Los Angeles, on my departure from that town in December, 1843, there were in circulation about 2000 ounces of gold, which had been extracted from the above-mentioned placer, the greater part of it destined to go to the United States. This metal contains, according to the certificate of its assay by the mint of this capital, which I sent to the Government at the beginning of this year, twenty-two carats two and a half grains of gold, fifteen grains of silver.

"September 1, 1844."

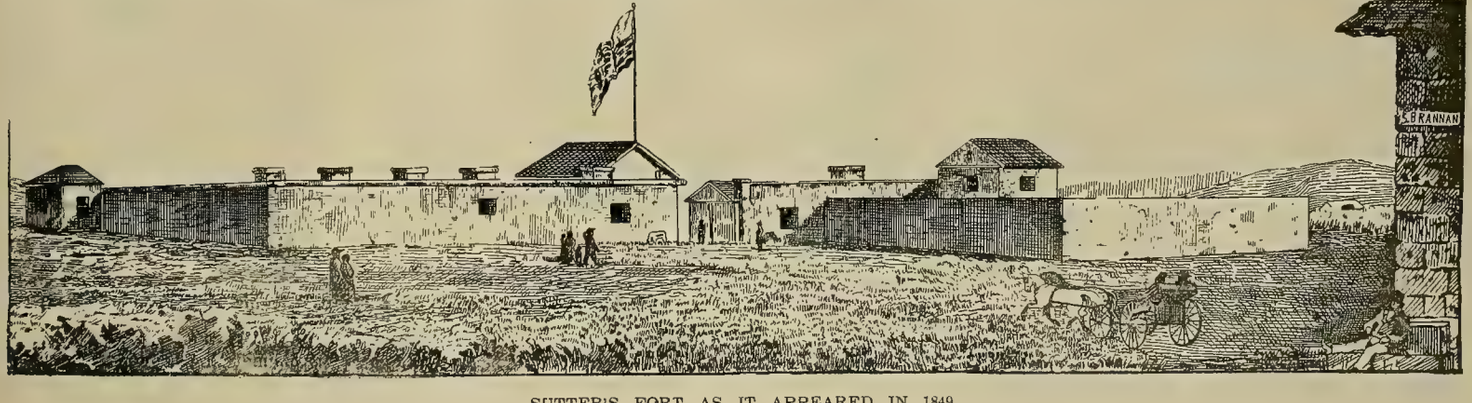


GOLD, AND PLENTY OF IT.

The foregoing, though a gross exaggeration of the real facts, establishes how thoroughly the Mexican authorities were posted as to any and all gold discoveries that had up till that time been made in California. Owing to various incidents and events connected with the acquisition of this country by the United States, and the efforts made by our Government for establishing steam communication with the Pacific coast, some have thought that the authorities at Washington had some unpublished advices in regard to the existence of gold here prior to the consummation of the treaty with Mexico and to their contracting for steamers to ply on the routes between New York and San Francisco. In support of this theory the fact is cited that within six weeks after the time that gold was discovered at Sutter's mill the treaty ceding to us this country was signed by the contracting parties, the Mexican Commissioners being ignorant of this important event and our Government affecting ignorance of it also. Then the vessels of the Pacific Mail Steamship Company were required to be ready for service by the month of October, 1848--just the time when the news of the gold find, having excited the more adventurous, had inspired thousands with a desire to emigrate to the new El Dorado. Pointing to this singular concatenation of events, it is argued that the American Government must have been actuated by some special reasons for hurrying treaty negotiations to a close, and for requiring the steamship company to have their first vessel ready to sail at this particular time. In the absence of any stronger evidence than the above, it is fair to presume, however, that officials at the national capital were no better posted in regard to the existence of gold in California than was the general public, the events cited being mere coincidences, such as might easily happen in transactions of this kind.

That the Government was in possession of more full and perhaps accurate information in regard to the mineral and other material resources of this country than the world at large is likely enough, as it would naturally take measures while negotiating the purchase of so much territory to ascertain something in regard to its probable worth. In the month of March, 1846, Thomas O. Larkin, then United States Consul at Monterey, in an official letter to James Buchanan, Secretary of State, writes as follows: "There is no doubt but that gold, silver, quicksilver, copper, lead, sulphur and coal mines are to be found all over California; and it is equally doubtful whether, under their present owners, they will ever be worked." In this expression of opinion, so temperate compared with the statements contained in the letters of Manual Castanares, our Consul may be understood to convey the idea that these various metalliferous deposits, until then so neglected, would be actively worked were the country owned by the United States.

In 1841, James D. Dana, mineralogist to the exploring expedition under Commodore Wilkes, which that year visited this coast, made an overland trip from Oregon to San Francisco. In a book on mineralogy, published by him the next year, this author states that gold was to be found in the Sacramento valley, and that he had observed auriferous rocks in southern Oregon, but that he did not consider these deposits of any practical importance. That Consul Larkin, in his letter to the Secretary of State, was speaking in an indefinite way, having but vague ideas as to the extent or value of the deposits he alludes to, is evident from the fact that he makes mention of silver, quicksilver, coal and sulphur mines, concerning which nothing certain could then have been known. He had, probably, no more exact knowledge of such mines than was common to the inhabitants of the country at that day. They had observed in certain places indications of the presence of these metals and minerals, and surmised that there might be valuable deposits at these points. With regard to gold, Mr. Larkin could speak with more assurance, as small quantities of that metal had for a number of years before been taken out at the San Francisquito placers and brought to Los Angeles, where it was sold at the rate of about $20 per ounce. As these were the placers to which Senor Castanares must have referred in his communications to the Mexican government, the extravagance of his language in describing them becomes manifest, when we reflect upon their



SUTTER'S FORT AS IT APPEARED IN 1849.

limited extent and the sorry showing they have since made in the gold product of the country.

The foregoing comprises about all the knowledge extant touching the occurrence of gold in California prior to January, 1848.

Why Fremont Failed to Discover Gold.—Having related all that was known as to the existence of gold in California prior to January, '48, we come now to consider some of the principal actors in, and the circumstances that led to, that event. Before entering upon this subject it may, perhaps, be proper to state that some surprise has been manifested that John C. Fremont failed to discover gold at an earlier date, seeing he was sent out by our Government to explore the country, was accompanied by a competent mineralogist and geologist, and arrived here nearly two years before the find occurred at Sutter's mill. It is argued that, having been dispatched on such special mission, and being aware that some placers had previously been found and worked in the southern part of the State, he ought to have struck gold somewhere along his route, inasmuch as it led down the south fork of the American river, on which the great discovery was afterwards made. But to this it may be replied: General Fremont, with his command, consisting of sixty-two frontiersmen, scientists and guides, entered the country in an exhausted and famished condition, having been forced to slaughter his pack animals to save himself and his men from starvation, and to cross the Sierra in the dead of winter. He was, therefore, obliged to push on to Sutter's Fort with all possible expedition, and, having stopped there for a few days to recuperate his men and animals, he hastened forward to Monterey. Arrived at that place, then the capital of the Department of Alta California, the Mexican authorities, suspecting that Fremont meditated some revolutionary movement, at once attempted to drive him and his party out of the country. What with resisting this attempt and the active part he took in effecting the conquest of California, the great explorer had quite enough on his hands for the next two years without thinking about or hunting after gold. That General Fremont actually did make an important discovery of gold, and refrained from giving publicity to the fact, as a few have surmised, is, for obvious reasons other than the above, a hypothesis with hardly the shadow of a reason to rest upon.



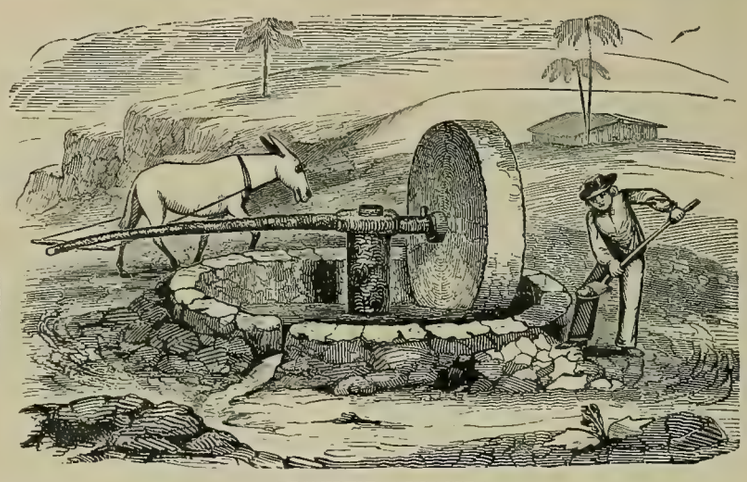
PREPARING FOR A PROSPECTING TRIP.

General John A. Sutter.—The most prominent character connected with the epoch in California history under consideration, and the most noteworthy of all our pioneers, was born in Switzerland in the year 1805. Bred to the life of a soldier, after distinguishing himself as a captain in the armies of France he emigrated to the United States. Arriving at New York in 1834 he at once proceeded west, going as far as New Mexico, where he tarried for a time. Not liking that country and having heard much of California, he joined a party of trappers and crossed the continent, going, contrary to his intention, first to Oregon. From there he took ship to Honolulu, whence he voyaged in like manner to California. This circuitous route was taken to reach his point of destination for the reason that there were then no vessels running between Oregon and Yerba Buena, while the overland journey was not easily made. On reaching California our adventurer at once made his way up the Sacramento river, and there, near the junction of that stream and the American Fork, erected, in August, 1839, the fort that afterwards bore his name, he having been guided to this spot by the descriptions of the old beaver hunters, with whom it had been a favorite camping ground, and who had recommended it to him as an eligible site for an agricultural establishment and trading post.

This accomplished, Sutter engaged in carrying out his purpose of growing wheat and manufacturing it into flour for the Russian settlement at Bodega, and of raising horses and cattle on an extended scale. For effecting his plans, a flouring and a saw mill became necessary. The former, a large, three-story, frame structure, was built only a few hundred yards without the walls of the fort. The nearest place at which timber suitable for making good lumber could be obtained being on the South Fork of the American river, distant about thirty-five miles from the fort, Captain Sutter determined to up put a saw mill at that point. The business of getting out the timber and constructing this mill was intrusted to James Wilson Marshall, who, assisted by a small company of white men and Indians, commencing work in the fall of 1847, had the building about completed and ready for running by the end of that year. Marshall, who was born in New Jersey in 1812, and brought up to the trade of his father, a coach and wagon maker, emigrated, when about twenty-one years of age, to Indiana, where he worked for a time at carpentering. Leaving that State, he sojourned for a while in Illinois, whence he made his way to the Platt Purchase, in the State of Missouri. Here he engaged in farming and trading, and, being tolerably prosperous, made up his mind to settle permanently. But a severe and protracted attack of fever and ague shook this good resolution out of him, and, as a means of escaping the dread disease, he finally concluded to come to California. This determined upon, he made due preparation, and, joining a company having a train of a hundred wagons, left about the first of May, 1844, on his journey overland. As the safest way for reaching California, Marshall, with a portion of the company, took the route through Oregon, where they wintered, and starting out the next spring came on to California. Reaching Sutter's Fort in the month of July, 1845, Marshall there made a halt, working afterwards most of the time for Captain Sutter.



PRIMITIVE ARRASTRA.



PRIMITIVE ARRASTRA.

When the Bear Flag war broke out, Marshall joined the American party, and did good service in the field. Hostilities ended, he returned to the fort, and was soon after employed to take charge of the mill-building business, an enterprise that he had some time before strongly urged Captain Sutter to engage in.

Finding the Gold.—In regard to this event, there are several versions extant. All, however, agree as to the main facts, their differences relating for the most part to unimportant particulars. Marshall's account of this affair, which has been generally accepted as entitled to credence, is about as follows: Finding the race he had dug below the mill not quite deep enough, he had adopted the plan of hoisting the gate and letting on a full head of water, for the purpose of washing it out to a greater depth. Walking down the race one morning to see what progress he was making with this work, he noticed a small piece of yellow metal lying in a crevice of the soft granite, which at that point composed the bottom of the race. Picking it up, he began to ponder what it might be, having an impression from the first that it was gold. Its weight and the crude tests he was able to make of this metal—such as pounding it between two stones and finding it malleable—so tended to confirm this idea that Marshall thought it best not to say much about the matter just then, for fear it might cause the men employed under him to quit work and go to gold digging. But for all that, the notion that this metal might be gold gradually spread among the men, who failed not to notice that Marshall



THE MINER'S DAY OF REST.



PRIMITIVE METHODS.

continued to look after and pick it up, he having in the course of a few weeks collected from the mill-race several ounces of it. This incident, afterward fraught with such momentous consequences, occurred on the 19th day of January, 1848.

Peter Wimmer, who was with Marshall when he found the first piece of gold, had also gathered a small quantity. Taking a portion of this his wife, who did the cooking for the men, had subjected it to what was considered a crucial test, boiling it in a decoction of strong lye. As the stuff stood this trial with out tarnishing, it was concluded on all hands that it must be gold; and so a feeling of interest began to show itself among the employes about the mill, despite the efforts of Marshall and Wimmer to conceal the real facts and suppress the growing excitement.

Meantime, Marshall having occasion to go to the fort, took some of the metal he had collected along with him and showed it to Captain Sutter, who proceeded to test it with nitric acid, whereby its true character was fully established. Comprehending the importance of the find, Sutter accompanied Marshall on his return to the mill, where he soon satisfied himself that the precious metal existed in such quantity as would be likely to work an early revolution in the then existing state of things. Nevertheless he found the men still at work, and affecting to treat the gold find lightly managed to keep them busied for some days longer, until the mill was fully completed and a small stock of logs gotten in.

By the time the news of the discovery had reached San Francisco, to which place a man named Bennett, one of the hands at the mill, had gone, taking some of the gold dust with him. Among others who happened to see this sample was Isaac Humphrey, who, having formerly worked in the gold diggings of Georgia, as soon as he beheld it not only pronounced it good gold but expressed the opinion that much more would be found where this came from. Such was the confidence of this Georgia miner in the new discovery that he left San Francisco about the end of February, and in company with Bennett went up to the mill. Arriving there on the 7th of March he found the men still at their work, none of them having as yet gone to gold digging. After prospecting a little with a pan, Humphrey constructed a rocker, such as he had been accustomed to use in Georgia, and commencing on dirt taken from the mill-race, washed out from one to two ounces of gold dust daily.

The News Spreading, and Its Effect.—The result of Humphrey's few days' washing put an end to all further operations on and about the mill. Work of every kind was in fact abandoned, all the whites in the vicinity building rockers and betaking themselves to gold washing. Even the mill, which Sutter and Marshall had so exerted themselves to complete, for a time stood idle. Getting in logs came to an end; building ceased; everything but gold digging was for the time being suspended. Everywhere, as the tidings spread, business came to a standstill. San Francisco was emptied of its adult male population. The American settlers residing in the valleys geared up their teams and set out for the mines, some of them taking their families with them. The rancheros and the vaqueros mounted their mustangs and started for the new El Dorado, driving their pack animals before them. And thus the country, before so quiet and inanimate, was now all astir; the whole population being moved by a single impulse—the eager thirst for gold.

So extensive was this movement, which may be said to have commenced about the middle of March, that there were collected in the mines before the end of the year as many as 10,000 or 12,000 men. While the most of these were residents of California, many of them came from Oregon, Mexico and the Sandwich Islands, with a few from Central and South America. As population flowed rapidly into the mines, so also was the business of gold gathering speedily extended over a broad stretch of country, having been in the course of a few weeks engaged in at widely distant points. Coming to Sutter's Fort about the middle of March, from his ranch at the head of the Sacramento valley, Pearson B. Reading visited the site of the new gold discovery. Finding the appearance of the country similar to that in the vicinity of his ranch, he returned home and, taking his domesticated Indians, was engaged before the end of the month washing out gold on Clear creek, nearly 200 miles to the northward of Coloma. John Bidwell, another large ranch owner in the upper Sacramento valley, having, in like manner, visited Sutter's mill, returned and went to work with his Indians on the bars of Feather river, nearly midway between Clear creek and Coloma. Towards the south the gold seeker also made his way, pushing out in that direction as far as the Tuolumne before the season was over; so that mining by the end of the first year was being pursued at intervals along a linear extent of more than 200 miles.



RECEIVING INTELLIGENCE OF CALIFORNIA'S ADMISSION INTO THE UNION.



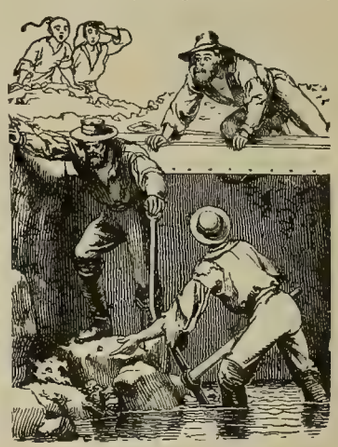
"OLD TUOLUMNE" IN '53.

General Sutter's Account of the Gold Find.—Before going on to further notice the changed condition of things produced by the discovery of gold in California, it may not be out of place to say a few words touching the accounts of that occurrence as given by different parties who had some agency in bringing it about or were in a position to speak authoritatively on the subject. General Sutter's version of the affair, as imparted by him to the writer, varies but little from that of Marshall, as already recounted. According to General Sutter's statement, Marshall, leaving the mill some time near the end of January, 1848, came down to the fort, where he arrived towards evening wet and covered with mud, the day having been stormy. His visit was unexpected, as he had been to the fort not long before. After talking a little about other matters he told his employer or partner—Marshall always claiming to have been interested with Sutter in the sawmill business—that he had some important information to impart to him, so much so that he wished to see him apart and where no one could see or overhear them. Complying with his request Sutter took him into his private room, but having neglected to lock the door a clerk entered just as Marshall, plucking a rag from his pocket, was about to exhibit its contents. Alarmed at the interruption, he quickly replaced the package, and when the intruder left insisted on having the door to the apartment locked. This done he again pulled out the package, and undoing a much soiled rag exhibited two or three ounces of yellow metal, which he informed his employer he believed to be gold. Sutter was of the same opinion, and after reading a description of the metal in an encyclopedia which he happened to have at hand proceeded to experiment on the dubious material with nitric acid, whereupon he found it to be unmistakably gold. So much was Marshall excited over the matter that he declined to remain at the fort over night, but left at a late hour and in a heavy rain to return to the mill, after exacting from Sutter a promise that the latter would follow him in the morning, which he did.

General Sutter relates that, despite the storm, which still continued, he started at an early hour the next day for the mill. While on his way, and when out about twenty miles, he saw, to his surprise, a man come out of the chaparral a short distance ahead of him. Riding up to the spot, he found this to be Marshall, who had already since leaving the fort been to the mill, and, there procuring a fresh



"WRITING HOME."



QUICK WORK NEEDED.

horse had returned thus far, when, overcome with fatigue and loss of sleep, he made a halt, crawled into the bushes and took a nap. When Sutter came up, having so refreshed himself and rested his animal, he had already gotten into the saddle and was about resuming his journey towards the fort. When interrogated as to his object in returning so soon, nothing very definite could be gotten out of him; the pretense that he had come on to meet the General and see that he did not miss the trail being evidently no part of his real purpose, as Sutter had already been over the road, which, being well marked by wagon travel, could not easily be missed. The truth was that Marshall had become so excited when it was shown that the stuff he had picked up in the mill-race was really gold that he could neither sleep nor rest until he had his partner on the ground and something as to their future course of action had been determined upon. Hence this speedy setting out again for the fort, the poor man in his anxiety fearing that Sutter, an easy-going sort of person, might delay his coming, or not fully appreciating the importance of the occasion, might fail to come altogether. This frame of mind on the part of Marshall sufficiently refutes the idea entertained by some that he was long in doubt as to the character of the metal he had found, and little conscious of the consequences likely to grow out of that event. He was not long in taking measures to confirm, what from the first he suspected, that the metal was gold, nor did he fail to comprehend the results that might be expected soon to follow.

On reaching the mill Sutter entered the race with Marshall, and walking down it picked up with his own hand several particles of gold. Adding these to some other pieces given him at the time by the workmen, he had a ring manufactured therefrom, on the inside of which was engraved the following inscription: "The first gold discovered in January, 1848."

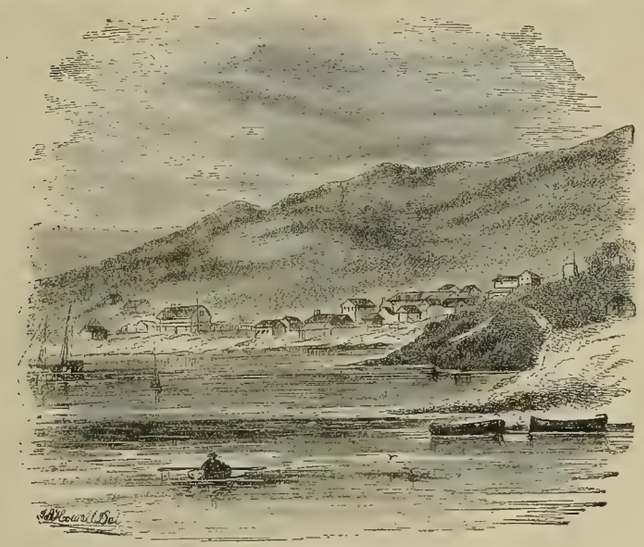
The First Piece of Metal Picked up by Marshall, and Mrs. Wimmer's Version of the Gold Find.—While the sentence as above inscribed was in some sense true, this ring of General Sutter did not actually contain the first piece of gold picked up by Marshall, though that is still in existence, and capable of being identified by many persons who at different times have seen and handled it. Owing to its size, shape and other peculiarities, persons who have once seen this piece of gold have no difficulty in recognizing it when shown to them again. It is rather flat, rough on all sides, of irregular shape and weighs about a quarter of an ounce, its intrinsic value being not quite five dollars.

Mrs. Jane Wimmer, wife of Peter Wimmer, who, as already stated, was cooking for the men at the mill, gives the following account of the discovery of gold, the circumstances under which it occurred and the history of the first piece of metal picked up: Her husband and Marshall, she says, were walking together down the race when they saw this piece of metal, both at the same time, though Marshall being a little ahead was the first to pick it up. Neither of them knew what it was, though both surmised its true character, her husband being so impressed with the belief of its being gold that he brought it to her and insisted on her boiling it in lye, which was accordingly done. After standing the test so well, Wimmer, satisfied that it must be a noble metal, urged Marshall to take some of it to the fort and submit it there to further trials, which the latter consented to do, Wimmer staying at the mill and looking after the men and the work during his absence.

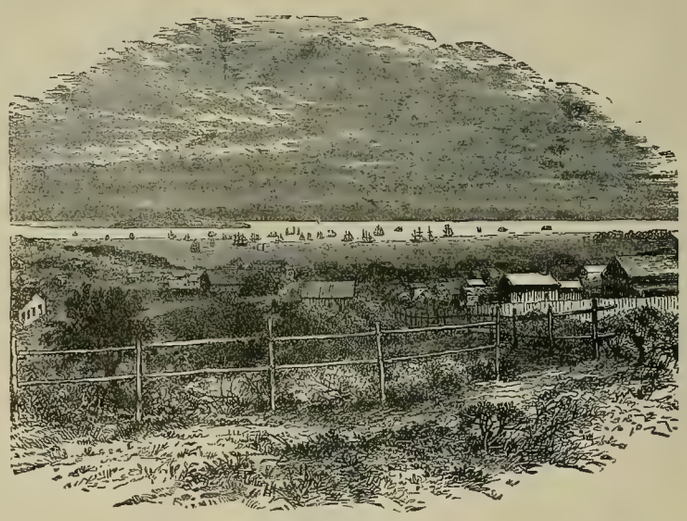
Marshall carefully preserved this first piece of gold for a time, saying he intended to have a ring made from it for his mother. But finally, being about to go away, having taken out a good deal of gold dust, and fearing he might lose this first piece of gold, he gave it to Mrs. Wimmer, both as a souvenir and as a means of greater security against its being lost. This occurred in the summer of 1849, and Mrs. Wimmer, who is still living, being a resident of San Luis Obispo county, has retained the specimen in her possession ever since. Though not rich she has refused many liberal offers for it, being unwilling to part with it unless assured that it would be retained among the pioneers of California, or at least be kept in the State. Some years ago the Society of California Pioneers tried to treat with Mrs. Wimmer for this interesting relic, which, owing to a failure of negotiations, still remains in the hands of its long-time owner.

[The editor of this paper is authentically informed that the original gold nugget picked up by Marshall is now in the possession of W. W. Allen, 323 Phelan building, San Francisco.]

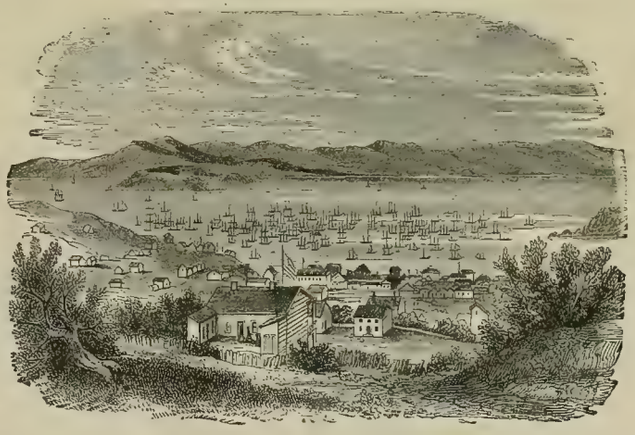
Their Fortunes and Their Fate.—And where are they, and how have they fared, these pioneers of the pioneers—what is to be said of them, these eyewitnesses of the great gold find—these men who were present at this new birth of California? Rich—millionaires, every one of them, we are ready to exclaim—very sybarites, living in palatial mansions, the recipients of that adulation and homage that large wealth never fails to inspire. In view of the great opportunities enjoyed by this first crop of the Argonauts, it would naturally be supposed that they had amassed riches beyond measure. But what are the facts? Unfortunately, quite the reverse of what the majority of mankind would expect, and very unlike what all could have wished them to have been. Not one of these men who were so permitted to skim the cream from the new El Dorado ever became rich; hardly any of them ever acquired, or at least retained, so much as a competence, while some remain, as others have died, miserably poor! Take for example the cases of Sutter, Marshall, Wimmer and Bennett, who figured so conspicuously in connection with the gold discovery: These men, though first on the ground, profited little in the end by that event—would have been better off, indeed, had it never occurred. It proved fatal to all, and especially so to Sutter, who, up till that time, had been successful in all his multifarious undertakings.



SAN FRANCISCO IN '47.



SAN FRANCISCO IN '49.



SAN FRANCISCO IN '48.

What worked the pioneers' downfall was this very discovery of gold, or rather the large and promiscuous immigration that it led to. That General Sutter was unable to cope with the sharpers brought hither by the inflowing tide, and who afterwards sought to circumvent him in every possible manner, or that he failed to protect his property against the rabble that tried to wrest it from him, proves nothing against his capacity as a financier or his efficiency as a business man. These new comers, with hardly more appreciation of the rights of the early settler than the Bedouins of the desert, squatted on his lands, dispersed his domesticated Indians, stole his cattle, and appropriated without compunction or stint whatever else of a useful kind they could conveniently lay hands upon. To contend with these hordes, armed with rifles and revolvers, and the still more dangerous instrumentalities of the law, would be like battling with a pack of ravenous wolves. That the hardy pioneer was despoiled of his property and finally vanquished in this unequal fight implies neither incompetence nor neglect on his part. Few men would, under the circumstances, have managed their affairs better, or resisted this system of wholesale despoilation more efficiently than did he.

General Sutter was in many respects a very superior man. His intellectual endowments were of the highest order. Physically he was equally well favored, being well proportioned and otherwise of great bodily perfection. He was highly educated, first in the schools and afterwards to the profession of arms, the versatility of his talents being manifested by the creditable manner in which he acquitted himself in both these callings. His aptitude for the acquirement of knowledge is evinced by the facility with which he read and spoke four different languages. He naturally possessed the instincts, and always, even in the midst of his rude surroundings, managed to preserve the manners and bearing of the gentleman, soldier and scholar. And yet, with so much to lift him above the common level, he was utterly without ostentation or vanity. Though learned and well acquainted with books, he was thoroughly practical, showing on all occasions the sagacious, enterprising man of affairs. He was the first to introduce anything like new ideas and modern improvements into California. Though he did not put up the first flouring or the first saw mill in the country, he was the first to erect establishments of this kind with a view to manufacturing flour and lumber for the general market. He was also the first to engage in the growing of wheat and the cultivation of the land on an extended scale.

The Testimony of General Bidwell.—General John Bidwell, himself one of the earliest, as he is also one of the noblest of the pioneers, bears efficient and kindly testimony to the high qualifications, personal merits and rich deservings of General John A. Sutter. In a letter written not long since to Captain William F. Swasey, and now in the possession of the Society of California Pioneers, General Bidwell, among other things, remarks as follows, his statements being here somewhat abbreviated: "General Sutter, when I first saw him in 1841, seemed to me the grandest man I ever met with. Of a fine presence and agreeable deportment he spoke German, French, Spanish and English fluently and well. As a conversationalist he excelled, being at home in the most refined and intelligent company. Yet he was not the least egotistical, but listened respectfully to every one, the high and low alike, and by his courteous manner making all with whom he came in contact his friends. He was a man of the purest honor and the strictest integrity. The California officials had such confidence in all he said or promised that when he sought land for a colony they readily granted all he asked for, and immediately put him in possession of the same. All who knew

were ready to trust him, the Russian Fur Company having sold to him, at the stipulated price of $100,000, but wholly on credit, their entire property at Fort Ross and Bodega. Becoming jealous of his growing power and exasperated at the partiality he manifested toward the American settlers, the Mexican authorities in California began at last to threaten General Sutter, going so far as to talk of expelling him from the country. When things had reached this pass Sutter advised these inter-meddlers that they had better refrain from threats of this kind as he was in a position to successfully resist any interference with his rights, and that if these menaces were repeated he might himself be constrained to act on the offensive, his main reliance in case this became necessary being upon the small number of Americans, not over fifty or sixty, then living in the vicinity of the fort or settled in the upper Sacramento valley. This defiant attitude of Sutter towards the departmental authorities having been reported at the national capital, Mitcheltorena was dispatched to California with 500 troops for the purpose of crushing out this growing spirit of insubordination, and, if need be, driving every American, Sutter included, out of the country. So far from accomplishing such task, this doughty commander, who was also appointed Governor, found it expedient to make friends with Sutter and his adherents, affairs having ultimately taken such turn that he who had come to expel others was himself expelled from California."



SAN FRANCISCO IN '49.

Continuing, our worthy informant goes on to remark upon the boundless generosity of General Sutter as manifested to all who, from sickness, misfortune or other cause, required assistance. No man, rich or poor, whatever his position in life or nationality, ever applied to Sutter for aid in vain. Whoever asked received, nor did he always wait for the suffering and needy to come and make their wants known. When he heard of an incoming immigrant train snowbound in the mountains, or suffering from want of food, he at once sent them provisions on pack animals, in barge of trusty men, these relief parties going sometimes far into and even quite across theSierra on these errands of mercy. All who arrived at the fort destitute were supplied according to their necessities, and this without any charge being made or anything said about future compensation. There being at that day no hotels or public houses in that country, all who came to Sutter's establishment desiring to stop were there entertained as free guests, however long they chose to remain. When General Bidwell and his companions entered the country, Sutter, hearing that there was a party coming in who were in need of provisions, forwarded them supplies while they were yet in the mountains more than a hundred miles away.

As a partial recognition of obligations for services so rendered, the Legislature of this State some years ago voted General Sutter a monthly stipend of $250, limiting the same to a certain number of years. On the expiration of this period this subsidy failed to be renewed. As a consequence, this fast friend of American institutions and interests in the Far West, this planter of the new civilization on the Pacific coast, the hardy explorer and typical pioneer, worn out with toil and weary with waiting, passed into the sere and yellow leaf of life, his last days pinched with want and clouded with sorrow. On the 18th day of June, 1880, the eventful career of the Switzer soldier was brought to a close in the City of Washington, whither he had gone several years before, in the hope of obtaining from Congress some slight compensation for the property of which he had been so unjustly deprived and the sacrifices he had made in behalf of republican institutions and the American people.

Through neglect and delay the ingratitude of California was paralleled by the injustice of Congress, which body, always professing a willingness to do justice to General Sutter, temporized until it was too late. Several members of the House, however, attended his funeral, and there was even a talk of having a stone placed at the head of the old man's grave. It would not indeed be at all strange if, after starving him to death, California should yet take measures to erect a grand monument over his remains. This is the way the world often treats its heroes!

The body of General Sutter, who was seventy-five years old at the time of his death, was taken to the little town of Letitz, in Pennsylvania, where his daughter resides, and there interred in the humble graveyard of the place. By his side his aged and estimable wife, since deceased, has also been buried.

As for Marshall.—Dating from the time of the gold discovery, the story of his life is briefly told. Having during the few months that followed that event collected considerable gold, some of it being a sort of tribute paid him and Sutter by the Indians, he concluded to leave the diggings, which he did. After a short absence he returned and again went to mining, at which he afterwards met with only moderate success. Tiring of this business, he betook himself to fruit and vine growing on a patch of land that he had always occupied near the mill, or Coloma, as the town that had here grown up had come to be called. Planting only trees and vines of choice varieties Marshall had here in the course of a few years the best nursery and vineyard in that section of country. Having lived here for some time in a comfortable sort of way he parted with this place, and afterwards does not seem to have had any permanent home or to have remained long in one place. For a time he lived in a cabin at Kelsey's Diggings, an ancient mining camp on the opposite side of the river a few miles above Coloma then. Latterly he sojourned elsewhere.



MINER'S CABIN.

On the morning of August 15, 1885, James Wilson Marshall, the discoverer of gold in California, was found dead in his bed in a cabin he had long occupied at Kelsey's Diggings, El Dorado county. From anything that appears to the contrary, he was in his usual health up to the night of his death, wherefore it is probable that he was carried off by heart disease, an attack of apoplexy or something of the kind. He was nearly seventy-three years of age at the time of his demise, having been born in the month of October, 1812, his birthplace being Hope township, Hunterdon county, New Jersey. He was buried on an eminence overlooking the town of Coloma, near the site of Sutter's sawmill, in the race of which the first piece of gold was picked up. The locality chosen for the interment of his mortal remains, selected by himself, is a fit one, as it was there the great event of his life occurred. Next to General John A. Sutter, Marshall occupies the most conspicuous place among the California pioneers. He died, as for the greater portion of his life he had lived, a very poor man, having belonged to that class of persons who, however favorable the conditions, never get rich. Why this is so cannot always be explained. Generally speaking, this class of individuals are deficient in some of the elements of business success, such as prudence, stability, economy, etc. He seemed to have been devoid of the acquisitive faculty; he was generous, given to acts of hospitality and prone to share what little he had with those in want.

It was unfortunate for Marshall that he came to be possessed with the idea that the world, and especially California, owed him a great deal. That this debt was not discharged, nor always even acknowledged to the extent he conceived to be his due, chafed him not a little, and so soured his disposition that he became at last somewhat querulous and misanthropic. The State of California did allow him a small pension of $100 per month, which, having been limited by law to a few years, at the end of that time ceased and was never renewed. It was a pitiful sum, just enough to wound the recipient's pride without being of much benefit to him. In the case of both Marshall and Sutter California has laid herself open to the charge of meanness, if not ingratitude, in refusing to grant these men a decent subsidy in consideration of the service they rendered the public. Far better would it have been for both had not an ounce of gold ever been found in the country, since in that event they would have retained the lands they once possessed, and been saved the humiliation and hardship of dying homeless and poor. As for Sutter, though perhaps in some things a little indiscreet, he had, by his boundless hospitalities to the early immigrants, and the splendid services rendered in the conquest of California, established such claims upon both the general and State governments as should have secured to him almost anything he requested at their hands.

Some of the stories related about Marshall, and one or two which are now being repeated on the occasion of his death, are at least apochryphal, if not wholly without foundation. For instance, what is said about people persecuting him with a view to forcing disclosure of rich diggings, of which he was supposed to have had a knowledge that he selfishly kept to himself; also, of his having been dispossessed of a large tract of land by the squatters, etc.; all of which is fiction. He was never the owner of or claimant to any large tract of land, wherefore it could not have been wrongly wrested from him. As to the story of his having had any knowledge of rich diggings that he refused to reveal for the benefit of others, that was still more absurd. Marshall, though the discoverer of gold, was not much of a prospector, having never gone far from Coloma in search of new diggings. The bar at Coloma, though extensive, was not extremely rich. The miners working on it as early as '48 averaged not much over one ounce per day to the man, the average earnings in '49 having been considerably less, while from that time on, till the bar was worked out, five or six years later, the average wages made were quite moderate. It is, therefore, evident that, as the old pioneer never made any very big raise at that place, so neither could he have had any knowledge of rich deposits there, as likely he had no knowledge of any elsewhere.

The truth is, the great gold find at Sutter's mill proved altogether an unfortunate event for Marshall. It lifted him above himself and his surroundings, caused him to lose his poise, and to let go his grip on the small and certain, and grasp to the grand, distant, and, as it proved in his case, unattainable. But for this untoward incident it is easy to see what sort of a life he would have led, and how he would probably have fared in the end. Having gotten his mill started, he would have gone on making lumber, from the use and sale of which, being in this business as a partner of Sutter, he would have, in the course of a few years, realized a competency.

Why the Early Pioneers Failed to Make Money.—Peter Wimmer, who was with Marshall in the millrace when he picked up the first piece of gold, though



THE BEAR FLAG.

a man of good habits, industrious, temperate and possessed of fair business capacities, never succeeded in acquiring very much property, the extent of his worldly wealth consisting of a small piece of land in San Luis Obispo county, on which he and his pioneer wife are, or at least were, living not long ago. Bennett, who brought the first samples of gold to San Francisco, though far from being rich, is in comfortable circumstances, owning and living on a piece of good land in the vicinity of Santa Cruz. He left the mines in the summer of 1849 and never returned to them. Of the considerable number of white men who were at Sutter's mill when gold was discovered, none ever became rich, nor did any of them ever acquire more than a very moderate competence. Several are known to have died, if not in indigence, at least quite poor. Of the residents of the country at that time only a few afterwards became millionaires, and these were made such through the increased value of their landed possessions, or by their engaging in other than mining pursuits.

The causes that brought men to California at that early day were such as little qualified them for rapidly accumulating property. The most of them came here in search of health or adventure, or in the hope of being able to live in an independent and easy-going way. Some were hunters and trappers, who, in pursuit of their vocation having drifted into the country, remained here. Some were border men, who had sought on this far-off coast a refuge from a too rapidly advancing civilization. A few were run-away sailors or mariners, who, attracted by the beauty of the country, the excellence of the climate and the hospitality of the inhabitants, had been enticed into a long sojourn on these pleasant shores. Whatever the causes that brought or kept them here, hardly any of these pioneers had in view the acquisition of wealth; wherefore, none of them can be properly called Argonauts, using that term in its primary sense. They were for the most part a hardy, brave and generous set of men, whose habits being simple and their wants few, neither craved nor had any need for much money. The most of them left their homes early and, retiring to their former homes, never troubled themselves much with gold digging thereafter.

It hardly needs that the names of these old pioneers be even so much as mentioned in this article, seeing so much that is noble and good has been recorded of them in the great work of Hubert Howe Bancroft on the Pacific States and Territories. Embalmed in the pages of the historian, their memoirs will be handed over to an honorable and an enduring fame. "The Natural Wealth of California," by Titus Fey Cronise, contains also much that is interesting in regard to the lives and characters of these men, who, journeying far by land or water, came early to make for themselves homes in this borderland of the Great Pacific Sea.

The New Era.—Arriving at San Francisco in the month of February, 1849, the writer found the place crowded with miners, who, leaving the diggings at the commencement of the rainy season, had come to the city to pass the winter. A more motley crowd, or one composed of such divers nationalities, was, perhaps, never before collected in one place. Almost every civilized people on the face of the earth was already represented here. The Mongolian only, of all the races now in the country, had not yet put in an appearance, the worst coming last. San Francisco, although a very Babel of languages, and the scene of indescribable activity, had up till this time remained peaceful and orderly, crimes and even misdemeanors of a grave kind having been of rare occurrence. While the merchants were busy, and the public places were thronged with frequeters and patrons, the miners, unconscious of impending events, were taking things easy. Though current wages were an ounce per day, not until they got dead broke did these old timers seem disposed to seek or accept employment. By the time spring came around the most of them had got rid of their earnings, a good share of which had passed over the gambling tables. Early in March, and before more than a few of them had begun to think of returning to the mines, the advance of a new immigration had begun to arrive—an excited, eager, rushing crowd—who, going for everything within reach, soon relegated to the background their predecessors in the field.

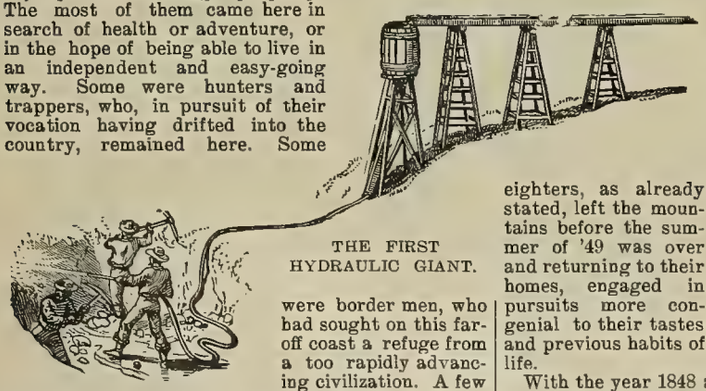


THE MINER'S CABIN IN DANGER.



A GAMBLING HALL IN THE EARLY FIFTIES.

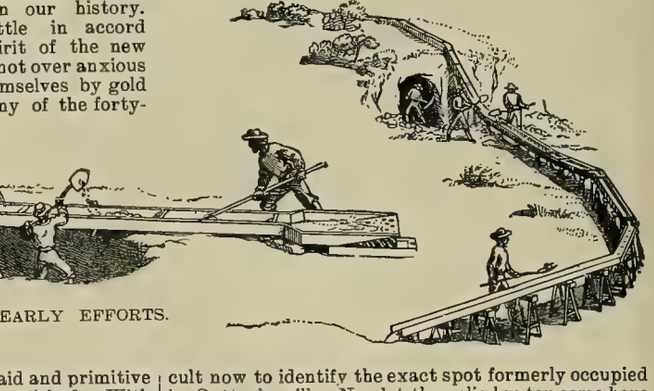
To such an extent, in fact, has the year commemorated by the discovery of gold come to be overshadowed by the stirring events that followed in its wake, that the year 1849 is generally accepted as marking the advent of the new epoch in our history. Being so little in accord with the spirit of the new comers, and not over anxious to enrich themselves by gold digging, many of the forty-eighters, as already stated, left the mountains before the summer of '49 was over and returning to their homes, engaged in pursuits more congenial to their tastes and previous habits of life.



THE FIRST HYDRAULIC GIANT.

With the year 1848 all that was staid and primitive in or about the mines of California vanished. With it ended the old civilization and the old scenes, new men with new ideas and different methods of doing business having come to take the place and accelerate the work of the first stock of pioneers.

Sutter's Mill.—The view given of Sutter's mill (see page 112) is taken from a painting by Nahl, and shows this famous landmark as it stood in the summer of '49 and for several years thereafter. The buildings seen in the background represent a hamlet that sprung up that summer on the opposite side of the river, the town of Coloma, farther to the right, not being shown in the cut. Having already made mention of the more interesting incidents connected with the history of this mill, it only remains to be said that it, like the baronial establishment at New Helvetia, has become one of the things of the past. But if the fort is so nearly gone, the very site of the mill has been razed. The rude structure itself has not only disappeared, but the ground on which it stood has been literally swept away. The dam, the race in which Marshall picked up the first piece of gold, the big pines standing fast by, as shown in the picture, are all gone, and in their place only piles of white boulders glisten in the sun. So changed everything, that but for the river, flowing as it flowed before, it would be difficult now to identify the exact spot formerly occupied by Sutter's mill. Nor let the relic hunter come here seeking mementoes or reminders of the past! The iconoclastic pick of the miner has spared none of these—not a stick or foundation stone or slab or splinter has been left. All is extinguished. Even the old town of Coloma has been nearly all washed away, the ground it covered having been sent down the South Fork.



SACRAMENTO IN '50.

SOME EARLY EFFORTS.



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MANY TESTIMONIALS ON FILE. HERE ARE A FEW SAMPLE ONES:

"I have used the Dioxide-Cyanide Process in my mining operations in Nevada. By its use I am enabled at a minimum cost to save 95% of the gold, and 80% of the silver; in chlorination all silver is lost. I am now treating by the process on an average of 70 tons daily, and by 1st of May will be treating 200 tons daily, and I am satisfied that it is the best chemical process heretofore suggested."—*Capt. J. R. De Lamar, April 20, 1896.*

"After several months' experiments with your Dioxide-Cyanide Process on tonnage lots, we can testify to the efficiency, reliability and economy of your process By the plain cyanide process our best extraction was 71% of the gold and 30% of the silver, by percolation in 76 hours. By your Dioxide-Cyanide Process our extraction was 92% of the gold and 85% of the silver, while the period of extraction was only 36 hours. The consumption of cyanide was only one-half by your process. The many points of superiority connected with your process are very manifest. We can cheerfully recommend your process."—*Oliver P. Posey, Gen'l Manager Tom Boy Gold Mines and Brigham Gold Mines Co., April 19, 1895.*

"The addition of Dioxide of Sodium materially increases the solubility of the gold in cyanide of potassium solutions; that is, a higher extraction at a less cost for chemicals consumed when your process is used."—*Prof. Nicolai Anderson, Ex-Chief Chemist, MacArthur-Forrest Process, June 6, 1896.*

"Tests 1 and 2, at 20 hours leach, only 44% saved by the plain cyanide process, and 77% by the dioxide, which is equal to plain cyanide at 70 hours, thus saving 50 hours by the use of your process.

"I am very much pleased with the action of the new process."—*Test on a difficult copper ore by J. K. Turner, Chemist, Gibbonsville, Idaho, Jan. 30, 1895.*

"We have been operating on Bingham ores for about 12 months, the first quarter using only cyanide, the remainder of the time cyanide in connection with dioxide. While using plain cyanide, our extraction was not good for either gold or silver, and the consumption of cyanide was excessive. Tests with the addition of dioxide invariably gave us better extraction, and consumption of cyanide reduced over 50%. All tests show that the time is materially shortened by the use of dioxide."—*Supt. W. A. Stephens, M. E., Bingham, Utah, Mill, Nov. 16, 1895.*

The American Cyanide Gold and Silver Recovery Co. is one of the most substantial mining concerns in the world It permits the use of patented processes on royalty, operates mines and mills, and purchases tailings and ore. Its operations are on a large scale. One of these was the recent purchase of 150,000 tons of tailings in an old camp in California. They seem to succeed where all others fail. After the 4th of July they will put a force of men at work on Camas No. 2 tailings.

As intimated above, there is no proposition too large for this company. In fact, the larger it is, the better they like it, as they cannot afford to bother with small propositions.—*Wood River Times. Hailey, Idaho, June 28, 1897.*

The importance of the cyanide process in the reduction of ores is illustrated by the fact that there are now five cyanide mills upon tailings of old mills.

The American Cyanide Co. recently closed a contract for the construction of a 400-ton mill upon the Golden Gate Mines at Mercur, Utah, owned by Capt. De Lamar.—*Denver Daily Republican, April 28, 1897.*

The American Cyanide G. & S. Recovery Co. had a very successful year. This company operates the Dioxide-Cyanide Process, all covered by several U. S. Patents, whose validity is unassailable. Infringers are, therefore, liable to injunctions and damage suits.—*Daily Rocky Mt. News, Denver, Colorado, Jan. 1, 1897.*

Since the introduction of the cyanide process, many miners have attempted the construction of crude plants for the treatment of their ores, without, in many cases, having made an analysis of the ores, and with little or no knowledge of the most economical method or treatment, even when the ores can be treated successfully by skilled men. The results are frequent failures, and the consequent damning of a process which has become firmly established.—*Daily Denver Republican, August 17, 1897.*

We are constantly in the market for good mines and tailing dumps. Prices must be reasonable and propositions of merit. Write particulars and for literature with copies in full of splendid testimonial letters from mills operating in the mineral regions. Address

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Golden : Jubilee : Mining : Exposition.

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James W. Marshall.

Elsewhere in this issue appears a biographical sketch of the life of James W. Marshall, the man who on Jan. 19, 1848, discovered gold at Coloma, El Dorado Co., Cal. Of himself, on Jan. 28, 1865, he made the following statement before Ogden Squires, at that time Judge of El Dorado Co., Cal.:

"I discovered gold on the 19th day of January, 1848, in what was known as the 'Sutter mill race' at Coloma, El Dorado Co., Cal. There were at the time employed about the works, in the building of the mill, and the digging of race, beside myself, Peter L. Wimmer, last heard of as residing somewhere in Napa Co., Cal.; W. H. Scott, died at Georgetown, Cal.; Alex Stevens, went to Salt Lake; Wm. Johnson, went to Salt Lake; James Barger, went to Salt Lake; Israel Perkins, went to Salt Lake; James Brown, went to Salt Lake; Israel Smith, went to Salt Lake; Chas. Bennett, dead. Mrs. Peter L. Wimmer was residing near the mill with her husband, Peter L. Wimmer, with the children, Elijah Wimmer and John Wimmer, sons of Wimmer, and M. V. B. Baize, sons of Mrs. Wimmer, and a son of Mr. and Mrs. Wimmer, name not remembered.

"I, James Wilson Marshall, was born at Round Mountain Farm, Hopewell township, Hunterdon county, State of New Jersey, on 8th day of October, 1810. My father's name was Phillip Marshall. My mother's name was Sarah Wilson Marshall, her maiden name being Sarah Wilson, now living at Lambertsville, Hunterdon county, New Jersey, aged about seventy-six. My father's mother's maiden name was Rebecca Hart, daughter of John Hart, one of the signers of the Declaration of Independence from New Jersey. I left New Jersey, went to Indiana, remaining there a short time, then went to Illinois, remaining there a short time, then went to Missouri, remaining there seven or eight years, then, in 1844, crossed the plains to Oregon, remaining there until 1845, when I came to California, where I have ever since resided, at present, as most of the time heretofore, at Coloma, where gold was first discovered. I selected the site for Sutter's mill in May, 1847. I superintended the work. We commenced the work, I think, in August, 1847."

There have been several claimants to the honor justly the due of Mr. Marshall. Some time ago Oregon developed "a discoverer of gold in California." On the tombstone of Captain Charles Bennett in the Rural cemetery near Salem it is recorded "that he was the discoverer of gold in California." Of this Stephen Staats writes: "As to the gold business, it is related that Marshall picked up something in the race at Sutter's mill, not knowing what it was, and showed it to Bennett, who examined the same and pronounced it gold. 'Why, that is gold!' was his exclamation. And this is the simple story of the discovery that may be said to have transformed society and worked such wonders in the material development of America, if not of the world. But the circumstance was merely fortuitous, and anticipated the event only a few months at the most. Adventurous Americans were beginning to enter California and roam over its wastes, and their sharp eyes would have soon detected the shining metal. But Captain Bennett was the discoverer of gold in California, nevertheless."

The real story of the "discovery of gold in California" is told elsewhere in this issue, as related by Marshall himself. It seems strange that Bennett's name was never linked with the discovery in any prominent way, and it is rather late to get any acknowledgment of his claim. The only other names connected with the occurrence are those of Sutter, Peter Wimmer and Mrs. Wimmer. Marshall and Wimmer were together when the gold was found, the former picking up the piece of gold in the tail-race. According to their version, they thought it was gold, and, finding more, kept the matter secret several days. Bennett is not mentioned by them or others. Marshall's statement is confirmed by Mr. and Mrs. Wimmer, Sutter, and all the hands at the mill. Henry W. Bigler's diary or journal, the only written record, gives the date as January 24, 1848; but Marshall puts it at January 19, 1848. This confusion of dates is explained by the fact that Marshall and Wimmer kept the matter secret several days, and Bigler recorded it when he heard of it. None of the participants of the event mention Bennett in any way. The credit of the discovery doubtless belongs to Marshall, and always will. The State of California some years ago erected a statue to his memory on a site near the point where the old mill stood. Standing on a rounded knoll overlooking Coloma, the Marshall monument presents a fine appearance in the distance. The site, which was presented by Placerville Parlor of the Native Sons of the Golden West, is excellent. Marshall's figure represents him standing, with a nugget in his right hand, while the left points to the site of Sutter's mill, where Marshall first found gold. Marshall is represented as dressed in a slouch hat, shirt with sleeves rolled up to the elbows, and pants with legs inside of rubber boots. A knife in its sheath is attached to his belt on one hip, while a holstered pistol adorns the other. The figure is large and life-like. The monument is of granite and some soft rock. The granite is all right, and the



JAMES WILSON MARSHALL.

monument would have been a success had it been made entirely of this rock. It cost $5000. On the side is the inscription, giving the dates of the birth and death of Marshall, and the statement that he first found gold in Sutter's mill-race on the 19th day of January, '48. On the opposite side are the



THE FIGURE ON THE MARSHALL MONUMENT.

names of the commissioners in bold relief, so bold that it would indicate that the monument was erected rather to their memory than that of Marshall.

On the front is an attempt to bring out in relief the seal of the State, while on the back is a supposed representation of Sutter's mill, the race, and a miner taller than the trees surrounding him, trying to hold fast to a perpendicular bank and dig at the same time. Nature is kindly obliterating all this, as the material in which it is gouged out is crumbling away.

It was Marshall's discovery which led to the rapid settlement of this State and the greatest gold excitement ever known to this world. Nevertheless, gold had been found in California long before, and was known to the Mexican Government. In 1844 Manuel Castanares, representative in the Mexican Congress from the Department of Upper and Lower California, published in Mexico the fact that placers had been discovered, and officially called attention to their importance. He said that in 1843 there were in circulation in Los Angeles about 2000 ounces of gold, which had been taken from the placers near there. This had been taken out in 1842–'43. Who made the original discovery no one knows; but it was that of Marshall that started the "California gold fever" that resulted in the memorable "days of '49."

Electric Power Transmission in Southern California.

In addition to the two enterprises which are to furnish electric power to Los Angeles and other southern California cities, from the San Gabriel canyon and from the Santa Ana river, there is another extensive project under way involving the bringing of electric power from Kern river, in Kern county, a distance of 108 miles, which would make it the longest power-transmission line in the United States, and one of the longest in the world. It is proposed to erect a power plant on Kern river, in Kern county, at which power will be generated and electricity transmitted to Los Angeles, Randsburg, and generally to mines, mills, pumping plants and power-consuming industries throughout the neighboring districts. It is claimed that power from this source can be supplied in such large amount, at such moderate cost, and with such ease and convenience, even in the most isolated localities, that it should stimulate industrial activity generally, and render possible the installation and operation of enterprises in less favored localities which have heretofore been impossible, because of the difficulty of obtaining fuel, and the consequent excessive cost of generating power. As the upper part of the company's works lies within the boundaries of the Sierra forest reservation, it has been necessary to wait for legislation by Congress permitting the occupation of the reservation, under regulations of the Department of the Interior; and then to make elaborate and detailed surveys and maps, and file them, with a formal application to the department for right-of-way on the reservation. Until the granting of this right-of-way, no constructive work would be permitted by the Government, and the plans of the company have thus been unavoidably delayed.

The Kern river is the largest stream in the southern end of the San Joaquin valley. Its flow exceeds in volume the combined flow of all the rivers between it and the Colorado. It drains an area of 2345 miles, lying chiefly in the most elevated portion of the Sierra Nevada, including within this drainage area Mt. Whitney, perpetually snowclad, and one of the highest mountains in the United States. The latent power of the river will be rendered available by suitable works constructed between the towns of Kernville and Havilah, the old county seat of Kern county. The plant that will be first installed will have turbines developing about 12,000 H. P. at the lowest stage of the river. The situation will permit of further power development to meet increased demands. From the turbines will be actuated the usual machinery of a polyphase system. The current generated by the alternators will be raised by step-up transformers to a voltage of from 20,000 to 30,000 volts, and at that pressure or tension sent over the wires to the different places of consumption. The greater portion of the power will be trasmitted to Los Angeles by a line of about 108 miles in length, passing through Havilah, Walker's Basin, Tehachapi, Elizabeth Lake, Lang's and Burbank to the north line of the city, where will be installed the requisite plant for reducing the voltage and changing the phase to suit consumers. As Prof. George Forbes, of Niagara power-plant celebrity, says:

"There is no difficulty or experiment in going to great distances; it is merely a question of expense, and of the value of power at the place to which it is transmitted. There are plenty of places in the world where it would pay to carry electrical energy 400 to 500 miles."

The Kern River Company's system includes the construction of a dam at the outlet of a natural reservoir site, and by this means the impounding of water to a volume of 42,000 acre-feet, the equivalent of 42,000 acres covered 1 foot deep, or 13,721,400,000 gallons. This water will be caught during the time of winter floods, and will not only abate their violence, but will afford sufficient water to increase the summer flow of the Kern river by nearly 50 per cent continuously during the period of low water, thus increasing the capacity of the company's power plant by that amount, as well as conserving the water supply of the whole adjacent district, and greatly benefiting the agricultural community below.

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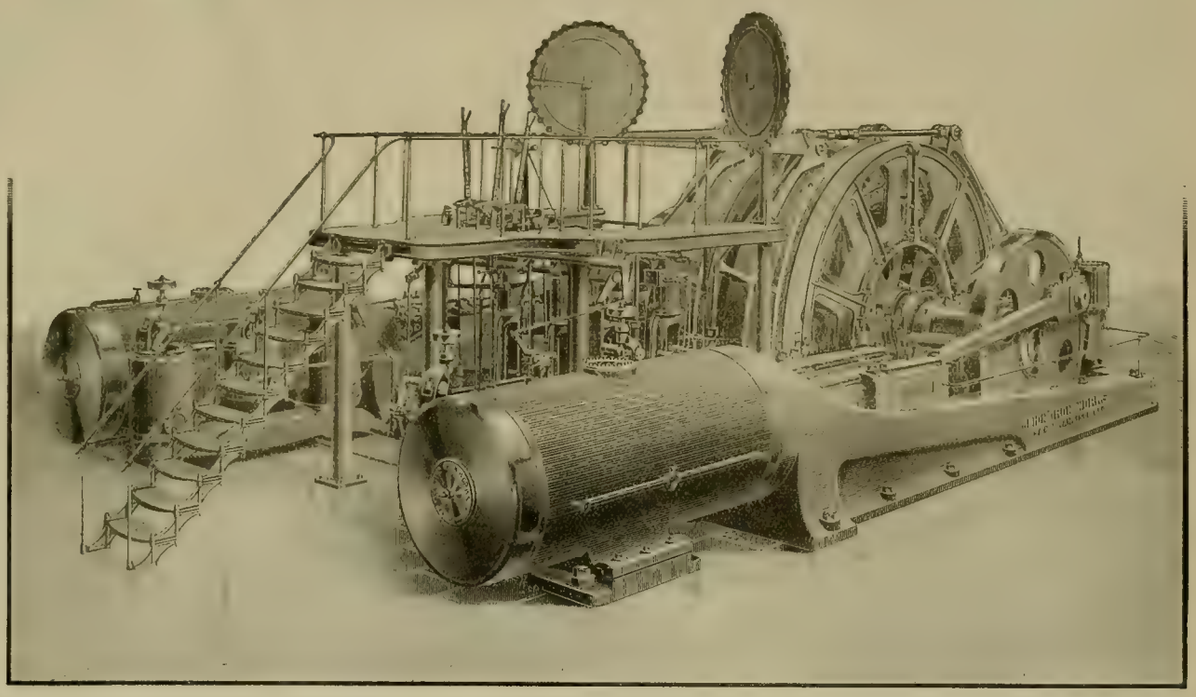
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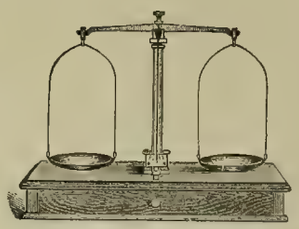
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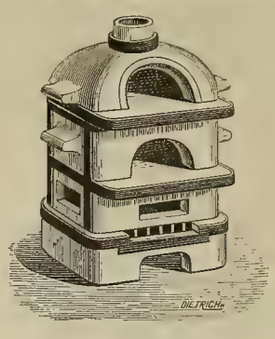


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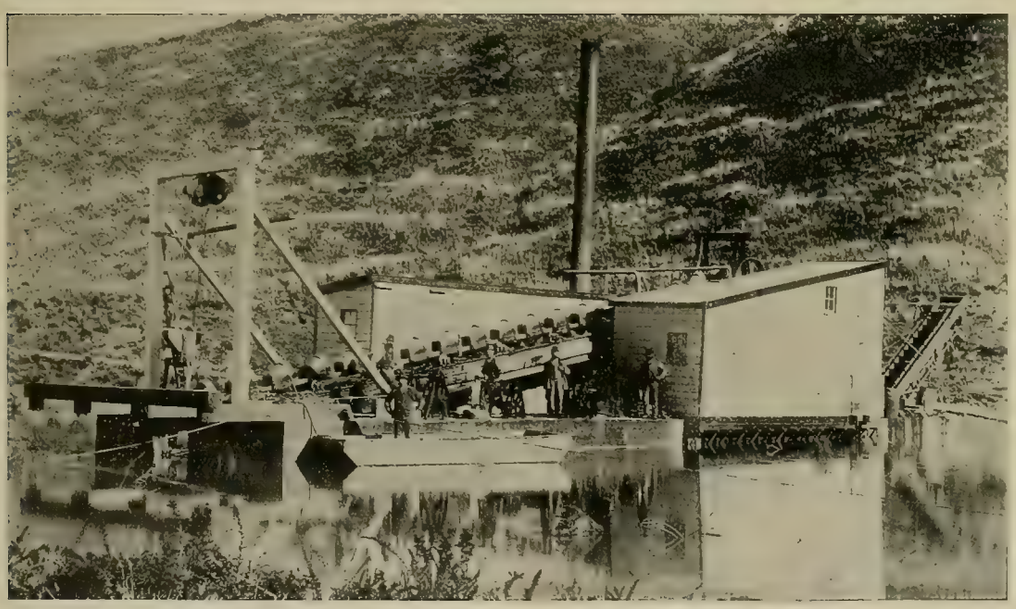
Gold Dredging In Calfornia.

Subaqueous mining has been tried at various times, with varying success, in this State. The history of dredging for gold in California is, however, not as satisfactory a one as that of any of the other forms of gold mining within the borders of this commonwealth. In New Zealand the gold dredger has gone through the costly process of evolution, resulting in the survival of the most practical and profitable machine, and on one river, the Molyneux, in that country, sixty dredgers were last year in successful operation. R. H. Postlethwaite, who has had considerable experience in New Zealand river dredging, last year had built by the Risdon Iron Works, of San Francisco, Cal., a dredge on the Yuba river, in this State, of which two views are herewith given.

The machine is intended to dredge 45 feet deep, with a gross capacity of ninety-three cubic yards an hour. The dredge consists of two long pontoons, each 96 feet long by 9 feet beam, connected at the stern by a pontoon 17 feet long and 5 feet wide, the bow being connected by a heavy overhung beam, practically making one boat 96 feet long, 23 feet wide, with a well-hole 5 feet wide running through the center for some 75 feet. The ladder, 67 feet long, is hung at the stern end by a bar fixed across a heavy wooden framing. The lower end of the ladder carries a five-sided tumbler, and is suspended by blocks and tackle to a cross-beam. By means of wire rope and blocks, the winch can raise or lower the bottom end as required. The top tumbler is carried by the timber framing some 3 feet above the top end of the ladder. The continuous bucket chain comes up the top side of the ladder on roliers, round the top tumbler, and back in a catenary curve to the lower tumbler. The top tumbler is driven, through a rope transmission an pheavy gears, by the engine, a vertical compound condensing one, which also drives the pump, and indicates about 35 H. P. The material discharges from the buckets into a delivery plate, down which it shoots into a revolving screen or grizzly. The centrifugal pump, throwing 3000 gallons per minute, supplies water



IMPROVED RIVER GOLD DREDGER—CAPACITY 2000 YARDS PER DAY.



IMPROVED RIVER GOLD DREDGER—CAPACITY 2000 YARDS PER DAY.

to a perforated pipe inside the screen, washing the material, the finer wash dirt and gold going through holes in the screen and falling into a distributing box. From the distributing box it passes on to a set of gold-saving tables, 11 feet wide, thence into a flume. Speaking of this machine, the builder says:

"Any ground which is not deeper than 60 feet below water level, or more than 20 feet above, and which contains boulders of not more than say one ton weight, can be handled at from three to five cents per cubic yard. The ground need not be in a river, provided the seepage is sufficient to float the dredge and keep the water clean enough to wash the dirt with."

The Risdon Iron Works has bought the patent and the right to build the dredge referred to.

The engraving on page 109 is from an original drawing of the premium battery of 1858, for which a gold cup was given. It was shipped from England for the Agua Fria Co. and erected at Grass Valley, Nevada Co., Cal., by Melville Atwood.

What Would Have Come of a Goldless California?

The Sutter-Marshall discovery of gold in California has had so much to do with the shaping of her subsequent career that one is prone to speculate as to what would have been the probable fortunes of this country had that event never occurred. Many there are who believe or affect to believe that California, by reason of her climatic attractions and her other natural advantages, would have become rapidly populated, and even made astonishing progress in other respects had no gold ever been found here. In support of this view we are reminded that a considerable emigration from the Western States had, as early as 1846, set in toward the Pacific coast, and that California, having a little later come into the possession of our Government, that emigration would, in any event, have been swollen into large proportions. The people who arrived in the country at that day consisted mostly of families who, bringing with them their worldly all, came here to make permanent homes. They left the Western States because of the severity of the winters, the frequent failure of the crops, and the prevalence there of the fever and ague, a malady from which most of them had suffered terribly. Finding in California such entire exemption from these evils, it may well be supposed that these people entertained no purpose of ever going back to their old homes to reside. As evidence of this we are told that the immigrants who reached the country while it was still under Mexican rule proceeded at once to obtain grants of land and settle upon them, they who arrived after the American occupation showing the same disposition to take up land and improve it for homesteads.

Very different was it with the immigration that arrived here after the discovery of gold. Few came to stay. During the twenty years following that event not ten per cent of all who came to California remained permanently. As a consequence, while the arrivals were many, the fixed population of the State grew slowly. Substantial improvements were retarded, nearly everything being done in a hasty and slipshod manner. Extravagance, improvidence and waste prevailed. Even in public matters was this the case, few having the true interests of the State much at heart. Out of this condition of things grew lawlessness, crime and a generally low standard of morality.

While it is possible that affairs might have taken a fortunate turn even though no gold had ever been found in California, the probabilities are that they would have resulted differently. It may be admitted that these emigrants from the malarious West, once in California, would have remained here. Also, that the movement so begun would have been kept up for a long time, and perhaps even to this day. Then, too, the slight immigration from Mexico, Central and South America, the Hawaiian and other Pacific islands, already in progress, would, no doubt, have been continued, and perhaps augmented. That the ubiquitous Chinaman would, in time, have put in an appearance may well be supposed. The number of runaway sailors, constituting always in the seaport towns a considerable percentage of the foreign population, would have grown apace, while the Mormons, who had sought on this coast an asylum before the era of gold, would have arrived in larger numbers than they did had that event never occurred, inasmuch as it tended to defeat the object they had in coming here.

Beyond peradventure there would, by this time, have been gathered in California a large population, had the gold find at Sutter's mill never happened. But, while so respect able in numbers, what sort of a people, let us ask, would have come of this strange agglomeration of races, the inferior so largely predominating? What sort of a civilization would have been developed through the mixing up of the pure Castilian and the Indio-Spaniard with the Western frontiersman, the Kanaka, the Mongolian and the Mormon? Little in the way of social, educational or industrial advancement could have been expected of a society so made up, there being present in this hybrid community too little of the American element to give shape and direction to public affairs or deeply impress American ideas on the institutions of the country. The native Californian with his few wants and his narrow ambitions being first on the ground and numerically in the ascendant, the habits and business methods of all would have largely conformed to his standard. Everything would have been performed in a slothful and dilatory way, nothing being done to-day that could be put off till to-mrrow, and nothing being done at any time that could possibly be avoided. The country, instead of being filled up with a thrifty, enterprising, wideawake people, would have been sparsely inhabited by a listless, procrastinating, ease-loving race, who to any appeal for haste, would have answered according to the established custom of the country, "*manana, senor, manana*," everything going on as in the olden time with its *dolce far niente*—sweet laziness!

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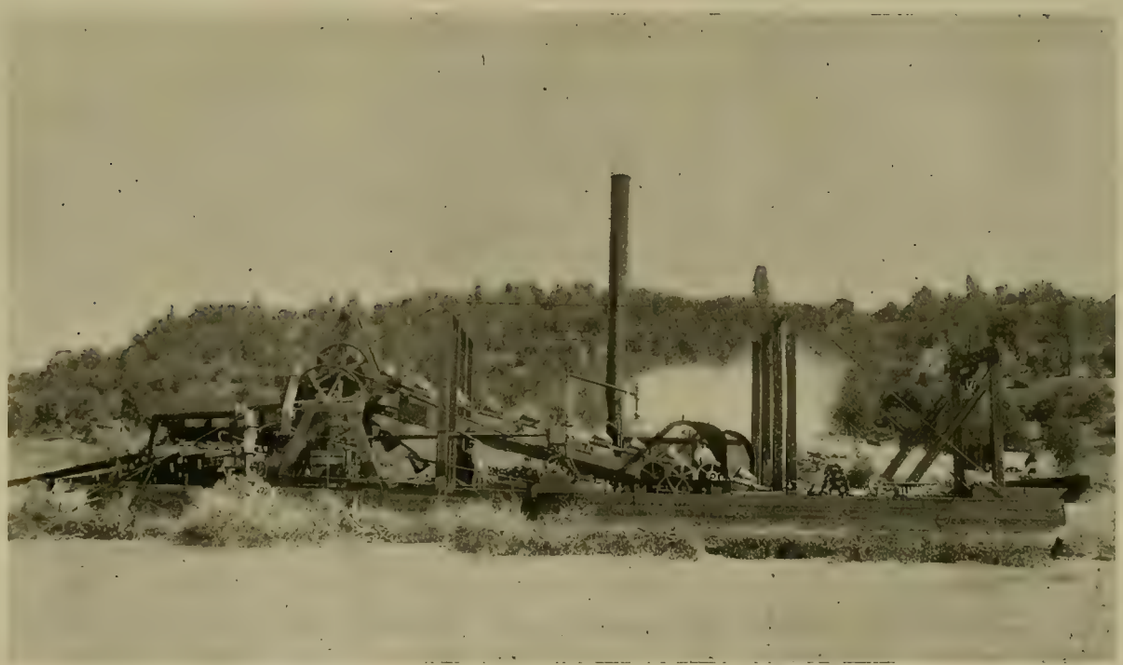
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Mining Summary.

Production of Precious Metals in '97.

Following is Wells-Fargo's annual report of precious metals produced in the States and Territories west of the Missouri river (including British Columbia) during 1897, which shows in the aggregate: Gold, $69,830,597; silver, $37,184,034; Copper, $36,645,694; lead, $9,775,144; total gross result, $153,435,469. The commercial value at which the several metals named herein have been estimated is: Silver, 60 cents per ounce; copper, 11 cents per pound; lead, $3.38 per hundredweight.

"Allowance must always be made for probable variations from reported figures, by reason of constantly increasing facilities for transporting bullion, ores and base metals from the mines outside of the express and the difficulty of getting entirely reliable data from private sources. Estimates obtained in this way are liable to be exaggerated, and are, to a considerable degree, guesswork; but with some modifications on this account, made herein, the general results reached, while only approximately correct, may be accepted as the closest approximation possible under the circumstances."

States and Territories.	Gold Dust and Bullion by Express.	Gold Dust and Bullion by Other Conveyances.	Silver Bullion by Express.	Ores and Base Bullion by Freight.	Total.
California	$55,800,374	$14,091,223	$32,378,200	$51,325,582	$153,435,469
Nevada	6,175,000		8,150,000	1,257,000	10,582,000
Oregon					
Utah					
Colorado					
New Mexico					
Arizona					
Dakota					
Texas					
Montana					
Idaho					
Washington					
British Columbia and Northwest Territory					
Totals	$18,546,700	$8,076,193	$12,948	$1,195,017	$18,830,858
	2,235,000		4,555,600	2,741,000	9,531,600
	4,450,000	1,341,374	401,453	284,053	6,476,880
	18,926,554	864,813	12,800,783	3,780,492	34,976,820
	798,441		813,748	6,770,440	9,377,412
	213,674	320,000	158,348	198,000	860,126
	1,555,873	1,837,118	148,693	3,698,421	8,239,505
	5,893,575		220,000	38,000	6,045,575
	5,000		309,717	1,800	316,517
	27,500		31,000	2,500	61,000
	1,291,940	2,910,785	45,000	1,160,000	5,407,725
	371,972		70,000	3,623,000	4,064,972
	1,200,005	1,341,374	401,453	284,053	3,317,885
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		1,291,940	45,000	1,160,000	5,407,725
		371,972	70,000	3,623,000	4,064,972
Totals	$55,800,374	$14,091,223	$32,378,200	$51,325,582	$153,435,469

The gross yield for 1897, shown above, segregated, is approximately as follows:

Gold (45 51-100)	$69,830,597
Silver (24 24-100)	37,184,034
Copper (23 88-100)	36,645,694
Lead (6 37-100)	9,775,144
Total	$153,435,469

The year's combined product of the metals herein treated of is the greatest in the history of the country, that of gold $69,830,597, being above any previous record officially reported, and the world's output of gold for 1897—approximately $240,000,000—is surprisingly large and more than 10 per cent greater than estimated by them six months ago. The most notable increases have been in the British Possessions of the Northwest, Australasia, South Africa, the United States of America and Mexico.

Exports of silver during the past year to Japan, China, the Straits, etc., have been as follows: From London, $37,255,807; from San Francisco, $11,-158,202; total, $48,412,009; as against $44,102,381 last year. Pounds Sterling estimated at $4.8665.

CALIFORNIA.

Butte.

At a meeting last month in London of the Golden Gate of California, Limited, preliminary notice had been given for the purpose of considering resolutions to reconstruct the company, that the company be wound up voluntarily and a liquidator be appointed, and he be authorized to consent to the registration of a new company, under the name of Alluvial Gold Mines of California, Limited. W. A. Ellis (chairman) said: "Most of you are aware that the company is in possession of two distinct properties, one being the Petewood, which is the old bed of a lava-capped river, to which I will refer later on; the other being the as yet unexposed bed of the Feather river. With regard to the latter property, which we have owned the longest, we have made inquiries at a very recent date, and our general manager informs us that he has not the slightest reason to doubt his ability to turn that river, and to recover the gold from its bed. We have also affidavits, as you will find in the report, to the number of twenty-two, from men who have lived in the neighborhood, some of them forty-seven years and none of them under forty years, and in every case those affidavits state that this part of the Feather river has never been worked, and the conformation of the ground shows this to be so. We ourselves had very great difficulty in getting to the river bed, with our very much more extensive appliances and works than any of the old miners could have possessed. When you consider that in combination with the affidavits we now possess, and which any one can see at the offices, you will be convinced that in that river bed we have perfectly virgin ground. The only question is the cost of working, and as to that we have received from our manager an estimate which shows that if it were decided at the present moment to undertake the working of that portion of the Feather river, it would involve our making a call upon the shareholders of something like 11s. or 12s. per share, which, of course, would be out of the question. We have a very small capital, and it is for this reason that undertaking works of such a magnitude would involve so large a call, though with the capital of most mining companies it would be a mere trifle. There are advantages of having a small capital like ours, but there are also disadvantages. The directors came to the conclusion that they must turn their attention for the present solely to the other property, and leave the development of the Feather river bed until a future time, which we hope will not be long delayed. Then we trust that either from our own profit, or from some other source, we may be able to work the Feather river bed. When we do, I am perfectly certain that the returns will be phenomenal. In the meanwhile we have to devote our attention to the Petewood claim. Since our report was issued, we have had one from our general manager, which I will now read:

"I have just returned from the Petewood mine, near Coutolenc, and have pleasure in reporting that the main gangway is now in 1350 feet, and for the last 300 feet is in gravels that prospect from 50 cents to $2 a car, some portions of the gravels being richer than other. I am pleased to report that the gold is getting much coarser, and the gravels now contain a larger percentage of heavy boulders, and from other favorable indications I am inclined to believe we are nearing the head of a break-out from a channel that at one time followed the main ridge. Unfortunately, this mine was opened in the early days in a very crude manner, and the main gangway had been driven a considerable distance without any idea of keeping same straight or effecting a uniform grade, and, owing to this fact, the cost of handling the material is so heavy that nothing but gravel carrying over $1.50 to the car can be made to pay. The gangway is more than double the length it should be, and this, together with its snake-like course, makes it impossible to handle more than from forty to fifty cars a day, while with a tunnel constructed from a deep gulch on the property we could tap the same gravels with a length not exceeding 560 feet, by means of which, on regular grade with two tracks, it would be easy to handle as high as 300 to 500 cars per day. One thing certain is that the gravels through which we are passing are payable if handled in quantities, and it is possible at any time to strike a rich lead, more especially after having found such coarse pieces of gold during this last month. By Wells-Fargo Express Co. I forwarded you last evening about fifteen ounces from this month's clean-up, to show the kind of gold we are getting, and, without doubt, by systematically working the gravels rich returns will be obtained. In conclusion, I have to state that, from the nature of the gold we are getting, the kind of washed and well-worn material through the gravel, together with the bedrock indications, we are likely at any time to open up a rich mine, and that even now with a shorter tunnel the present ground could be made to yield a large profit. You may rest assured that you possess a valuable property in the Petewood mine; the gold such as that sent you is sufficient evidence of this fact."

"Mr. Evans," continued the Chairman, "estimates it will take five months to drive this new tunnel. To complete everything will cost about 3000£, which is an extremely small sum to require for opening up a property of this size. We also believe that this is a continuation of the famous Indian Springs channel—a property which yielded a profit of over $5,000,000. We ourselves have over miles of channel.

"In the notice we have referred to the new company as 'The Alluvial Gold Mines of California.' At first we thought it well to change the name, though personally I was sorry to do so, and was glad when one or two of the larger shareholders begged us not to change the name. I shall be pleased to adhere to the old name, of which we have no reason to be ashamed. We propose to adopt the same name as at present—Golden Gate of California. We have proxies representing 60,000 shares, and as our capital is only 80,000£, we have much more support than is required by the laws of California. The details of the scheme have been laid before you. We propose to call up 6d on application and 6d. on allotment, and we hope and believe that this will carry us on to the time when we shall be making returns, though, of course, I cannot guarantee this." The proposition was agreed to.

THE KLONDIKE.

Under date of Dec. 7th the following is received from Dawson City. It gives a good idea of the present condition of affairs in the Yukon:

A good dog train—about five or six dogs—will make the trip to the head of Lake Bennett in about twenty-five days, and pull 300 pounds and two men. They use sails when they can. You would be surprised at a dog team. A dog will pull as much as a man. Good interior dogs are hard to buy at $150 to $200 each. Dog feed gets as high as 40 cents per pound. Dried salmon is the best feed for dogs or man in this country. It has been all bought up; cannot get a bit here. Moose meat is same as beef—at $1 to $1.25. Quite a number have been killed twenty-five to thirty-five miles away. They are as large as a horse.

Coming in, we landed at Skaguay with lighters on the beach. We had to work in line handling goods; a hard job; then hustle them above tide. The tide rises 17 feet; runs up the beach for over half a mile. There were three or four wagons there that made $80 to $100 per day. Then the town was all tents, excepting two houses. When we left the train there were nearly fifty houses, most all frame, and 3000 to 4000 people. I have heard since it is quite a city, and was hurting Juneau. Then, after getting our goods above tide, we hired wagons to haul them to the foot of the hill; 3 cents per pound for three or four miles. Here the —— packing commenced. On a good, tough hill we packed one day, and then hired a man. We finally had five men packing for us at $6 per day and board. We paid for packing about $550. When Holderman went ahead to build the boat I had to let the men go for want of money, and pack'd it alone. I moved the whole cache by somebody I could trust; only lost some bacon and one sack of flour. Some lost 1000 pounds. The stove is smoking and the tent is full of smoke. The tent is covered with frost. I think it will be 20° below in the morning.

Well, Skaguay trail again! To gain time after crossing the summit, which is one of the easy hills, we went by the lakes—Summit, seven miles; Middle, five, and Shallow four. This saved us about ten miles and cost about $65. We landed our boat in Lindermann, but had to pack about one mile at the foot to Lake Bennett. Here I met Mr. Wood first. Run the boat over the rapids, called a few leaks and then loaded her at the head of Bennett and started across twenty-one miles, in a snowstorm and head wind, camped at night and went out of here as fast as a horse could trot the next forenoon. The waves were six feet high. We had dinner at "Caribos Crossing" and got into Lake Tagish soon. We got to the "Windy Arm" about 4 o'clock and started across it. Oh, but she was rough! We went to the left of the island. (Should have gone to the right.) Saw rocks near us that were so low that you could not see them if it had been smooth. The wind was fierce and we had to make three tacks to get across. The white caps came in the boat and kept one man bailing. We finally rounded the point about 6:30 o'clock into calm water, and a good camping place, the three happiest fellows you ever saw. It was a close shave, and I will never forget "Windy Arm" on Lake Tagish. We went out of Tagish about 11 o'clock the next day and found the custom officers waiting for us. They robbed us of $61, and we went through the river and were into Lake Marsh before night. The lake was fine—a nice sailing breeze and straight ahead; was soon into the river the next day and at night at the canyons. Ran the canyon with an empty boat. It took three minutes for three-fourths of a mile, but had to pack goods one mile. Then came "White Horse Rapids!" Paid a man $10 to run our boat with about 500 pounds in it; packed goods one and one-fourth miles. With a good boat 25 or 30 feet long both of these can be run loaded without danger. She may be in the air part of the time; but keep her straight and send her as fast as possible (which is about twenty-five or thirty miles an hour), and there is no danger. Next is Sixty mile river. The current is six to eight miles per hour. Then the big lake of all—"La Barge." We rounded it against a strong wind and started close to the left shore. It took forty-eight hours of the hardest rowing we had, then another swift river to "Five Finger Rapids." We did not stop; took the right hand opening and went a-flying, and was into "Rink Rapids" and through it in one hour into the Lewis river (it is the Yukon). We came down it good and fast to the Pelly river and stopped at Fort Selkirk.

Just a word more about the trip. It was high water when we came; always is at that time of the year, and is always low in the spring, and, of course, more rocks, but the months of February and March are the best times to come. March is about right for the "Dyea Pass." A man can walk along with from 250 to 300 pounds on a sled, excepting 9 00 or 1000 feet going up the top of the summit, when he can use a rope and pull, but at that time of year a man wants smoked goggles and a couple of heavy black veils. The sun burns until lips and nose are like liver. Also ice creepers and good sleds with double enders, with about one-half inch rocker build are the best. The best bed I have seen here is a swan's down sleeping bag; weighs ten pounds and costs $25. It is as good as two pair of Mackinaw blankets, and is warm enough with a rubber blanket under it, excepting in the coldest weather, when they wrap a Mackinaw around it, or a well lined fur robe is better than blankets—a good large one.

In the grub line, get everything condensed that can be bought that way, sugar, etc. Do not forget warm footwear, mucklocks, etc., also mits. Heavy fur coats are considered a good thing to freeze a man to death, except he is riding. It makes him sweat, then he chills easily. The man who will take this out—Harry Coyle—is going out with dogs 30 or 40 miles per day, and will be back in March with horses and sleds loaded with flour, oysters, etc. A sack will bring him near $100. It is a hard trip, but he drove a dog team for three years for the Hudson Bay Company.

Since I wrote the last page of my short letter I have been looking for all the news I could get concerning the different mines around here, but I have not learned very much, excepting that the prices are higher on most of them. McDonald's mine on Eldorado he holds at $750,000. I guess it is worth it, and some others above half a million. Claims along here that are about one-fourth prospected are held from $5000 to $15,000, but Bonanza and Eldorado both will be thoroughly prospected this winter. It has not been cold enough, but now it is 16° below, and was 32° a couple of nights ago. The claim below us, No. 35, is taking out 6 feet of dirt that runs 35 cents per pan. If ours does as well we can make good wages, after giving 50% to the owner. Some parties have been buying claims on this creek down where it empties into the Klondike, to take out and sell.

No prospecting has been done, excepting by a few of them could not get a color on some of them. They are considered worthless. I heard that one of the claims on Indian river are proving good. The law allowing 100 feet on gulch claims is being enforced. They let them take 200 feet, but tell them to do all their work on the end nearest (discovery). This leaves alternate 100-foot claims to the Crown. The Gold Commissioner says he will not take them unless he has to, but the people do not believe it, as the law has already passed the Common Parliament. This will cause hundreds to go into Alaska next year. People are sick of these and other laws, the 20%, etc. Next year early, when the $100 is due to the Crown, hundreds of claims will be dropped, then put up at auction and sold by the Commissioner; then will be the time to buy claims. I will keep a tab on the different creeks as well as I can, so if you do come in it can be of great help to you. I want to go out prospecting as early as I can in the spring. Every good and no-good is taken around here, except a few bench claims that are left. I may take one of them.

It costs $1 per letter to send mail out there to you. Do not know that it will go. I saw a fellow going out at Fort Selkirk that had lost fifty letters. We got there October 2. Stopped and helped Jack Dalton (Dalton Trail) kill forty-seven head of cattle, and bring them and 100 head of sheep down on three rafts—$10 per day, and all the beef we could eat. It tasted good after two months on bacon.

By the way, I am writing by a dip (bitch) of bacon grease. Candles are $1 each, and we have only two boxes and will need them for drifting. It took us nine days to kill and land at Dawson. They sold for $1.25 and $1 hind and fore-quarters. Dressed about 700 pounds each. Dalton had sent several rafts before; he clean'd up nearly $50 000 on cattle in five months. Mr. Wood caught us two days out from Selkirk. I called him ashore, and Dalton hired him, so he came with us and is with us yet. We are building a cabin on claim 34, Bonanza gulch. Have taken a "lay" (lease) 100 feet. The claims are 500 feet up and down the gulch. A lay is about 50 feet, more or less; generally 50 feet for two men. Bench claims are 100 feet square. We expect to begin sinking a shaft in a day or two. It will be about 20 feet deep here, and will take ten days. The hole is 3x6 feet, frozen from top to bottom; has to be thawed all of the way. The weather is the best it was ever known here. At Selkirk it was 10° below one morning; then got warmer. The coldest here was 26° below. It has been above zero most of the time since. We have got a stove in the tent and are very comfortable. These British laws are funny; you get a permit to build a cabin and cut wood, and then you can go on any one's claim and do both. The claim owner does not own anything but the gold on his claim, and he has to pay $100 per year. I saw Mike Cassion and the Elliott boys. Mike is on 22, Eldorado gulch, and the Elliotts on 7. Bonanza—both in good territory. Everything is staked in all directions. Some of them are out in the hills fifty or sixty miles now with a pack. It is liable to be 50° below in a week. I think there will be plenty of them found dead in the spring. We do not intend to go out until spring after we wash our dump.

Sunday, we worked all day on the cabin, 16x18. The logs in it are from 10 to 14 inches in diameter and laid in moss. The roof will be poles laid tight, moss between them, about 8 inches of dirt. It will be 14 to 15 inches thick. Our windows will be made of bottles, as there is no window glass here. A doctor in Dawson offered $50 for a six-light sash. They told him he could have it for $100. On the claim, fine timber; I cut a tree yesterday 150 feet high, but up the gulch further some of them go as far as a mile and a half for house logs and wood to burn the ground with. It will cost us but little to get wood. The water is not very good; affects the kidneys. We will melt snow as soon as it gets deeper. Well, I suppose you would sooner hear something about the gold in this country. It is hard to tell much about it that you have not heard before now. Like any other diggings, it has its rich and poor ground. Eldorado gulch, a branch of Bonanza, has proven the richest. Every claim and every lay is being worked now. The coarsest gold comes from there and from Skookum Gulch, which is near it, but in bench claims on Skookum from 25 to 50 feet above the water.

On Bonanza the gold is finer and generally not so rich, but a few claims that were worked last year were as good, or nearly so, as the others. The dirt you hear of and see generally is from 10 to 20 cents a pan, but often as high as $1 or more. The big pans told generally are of bedrock. Bedrock is of a bluish slate here and lays from 3 to 25 feet deep, but averages about 15 feet. These gulches are all marshes. The muck is about 9 feet deep, more or less, and gravel (river-washed) the rest of the way to bedrock. Some of the gravel is pay for 6 feet above bedrock, but generally from 2 to 4 feet is thawed by standing the wood up against, so the fire will not strike higher than pay. The first thing in the morning is to take out the unburned wood and big rock, then dig out the gravel and send it up. This is done in a couple of hours; then fire it again, and clean-up for the night about 4 o'clock. When the drift gets large enough, one fire at night is enough. It is still too warm to use two fires, as it thaws the sides of the shaft and does not have time to freeze solid again. This makes too much dead work. The gulch claims cannot be worked in summer, for this reason and water, but by lagging the sides. Bench claims are worked all summer. This is the Twandike (Klondike) division of the Yukon mining district. You cannot record but one claim in it. Each stream flowing into the Yukon is a division. There was not a claim on the Klondike until three weeks ago. They could not find anything else to locate, so some chuchalkers (new comers) located it from the mouth of Bonanza to the Yukon, about two miles. There has been nothing found on the Klondike yet that is worth anything.

The Stewart and Indian rivers head within about forty miles of here. Each of them is a division. A great many are taking up claims there. I saw one fellow start for Indian river to-day. He is all right if the thermometer does not slide down to 40° or 50° below. I have heard some good reports from both rivers, especially Quartz creek, a branch of Indian river. There will be more than a hundred times as much work done here this winter as last, but the question is: Will they take out more gold? I think they will. A lay gives one-half to the claim owner. Then there is talk of the 20% royalty law being enforced; that leaves 40%; so you see it has to be pretty rich to pay wages, which are $15 per day—I mean $1.50 per hour. There are about six hours in the short days.

The grub question here is the main one. Flour is $75 to $100 per 50-lb sack; bacon, $1.50 to $2 per pound; beans and rice, $1.50 to $2 per pound; candles, $1 each; sugar is plenty at $30 per barrel of 100 pounds, tea at $1. Plenty tea and sugar are all that the stores (two stores) sell that you can eat. Everything else is in about the same proportion. The only chance to buy grub is to find some one going out. There has been a great many gone down the river to Circle City and Fort Yukon. Fort Yukon and Circle City is as far as the boats got this fall (stuck on a bar). There are 1000 tons of grub at Fort Yukon. There are hundreds waiting for the river to freeze over, so they can get back to Dyea and Skaguay. Some are after grub to speculate on, others will stay out. Many of the old-timers leave for Circle. They are tired of British laws. It is estimated that from 25 to 30 per cent are leaving here. Three men came down the river with us that stayed in Dawson two days, then went on to Fort Yukon. Many have not half enough to eat till summer. They will be going all winter. Some of them are claim owners.

MONTANA.

There was an increase in every branch of mining except in silver during '97, and even the silver output was larger last year than '96, because of the continued increase in the production of the copper mines at Butte, the ores of which also carry silver. There are now less than half a dozen exclusively silver mines operating in the State. The gold output for 1897 was about $1,450 000 as compared with $1,-380,671 for 1896. There was a notable increase during the year in gold receipts from river dredging, although the production of placer mines operated by hydraulics and sluicing was less than for 1896, owing to a shorter season. During 1896 the placers of the State yielded 13 per cent of the entire gold production. The most notable increase in production for 1897 was from Montana's copper producers. The State produced in 1896, 232,096,000 pounds of copper valued at $25,356,540. Mr Braden estimates the value of the copper output for 1897 at $27,000,000

COLORADO.

Among Colorado dividend-paying mines are the Anchoria-Leland, 1c per share, monthly, payable 15th, total paid $108,000, including that declared for January, '98; Argentum-Juniata, 3c per share, monthly, last dividend November, '95, total dividends paid $156,000; Bangkok-Cora Bell, 1c per share, irregular, total paid $107,500, last dividend Nov. 5, '95; Big Six, ¼c quarterly, total paid $15,-500; Elkton Con., 2c per share monthly, payable on 20th, total paid $126,960; El Paso Gold, 1c per share, paid Dec. 10, '97, total $17,285; Gold Coin, 1c, Dec. 29, $20 00; Golden Cycle, 1 cent per share per month, paid $130,000 in dividends since May 1, '97; Golden Eagle, Leadville, amount dividends paid to date $60,000; Golden Fleece, varying from 1 to 3c per share, monthly, payable on 15th, total paid $575,497.85, last dividend paid Feb. 15, '97; Gold and Globe Hill, $3 per 100 shares, monthly, total paid $51,625; Iowa (Silverton), 1c per share, monthly, last dividend Dec. 15, total $75,000; Isabella, quarterly, payable on 25th, total paid to date $270,000; Lillie G. M., commenced Oct. 20, '97, 1 cent per share, total dividend paid $37,110; Mahala, monthly, total paid $750,000, netted $30 000 for December; Marion Con., paid in royalties $244,702 in two years; Mt. Rosa, paid $50,000 in dividends from sale of property, with $30,000 in treasury, last dividend Dec. 28; Moose, 1c per share, last dividend paid Feb. 10, '96, total paid to date $186,000; Moon-Anchor, 2½c per share, monthly, payable on 1st, total paid $90.000; Mollie Gibson, last dividend January, '95, total paid $4,080,000; Nugget, total dividend paid $15,000 last dividend April, '96; Portland, from 1c to 3c per share, monthly, payable on 10th, total $1,297,080; Pharmacist, paid $81,000 in dividends, nothing for over three years; Princess, ¼c per share, irregular, total paid $45,000; Smuggler of Aspen, last dividend paid November, total paid $925,000; Smuggler-Union (Telluride), pays $1 per share, total paid $100,000; Strong, total dividends $300,000; Rebecca, $20,000, last dividend Feb. 26, '96; Tom Boy (Telluride), dividends paid $700,000; Union, 1c per share, monthly, total paid $82,744 and a 10 per cent stock dividend, last dividend paid June 25, '96; Union Leasing (Leadville), 4c per share, monthly, last dividend July, '93, total paid $340,000; Victor, 15c per share, quarterly, payable 10th, total paid $895,000, dividend declared 15c, with an extra of 5c, making $40,000 for December.

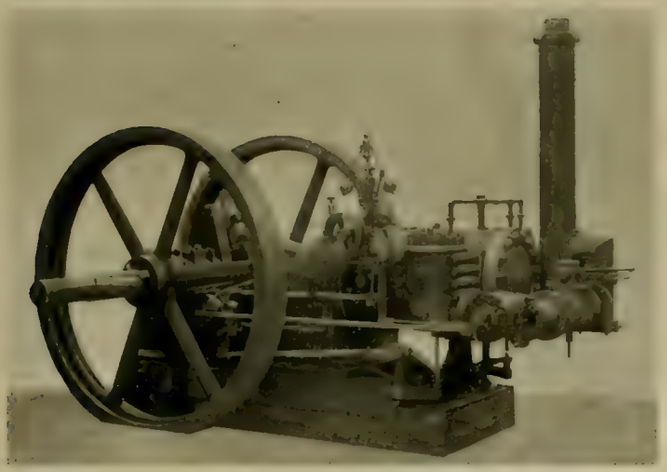
UTAH.

Following is a list of dividends paid by Utah listed mining stocks in 1897: Bullion Beck, $170,-000; Centennial-Eureka, $90,000; Chloride Point, $5 000; Daly, $37 500; Eureka Hill, $200,000; Galena, $5,000; Geyser-Marion, $63,000; Golden Star $5 000; Gemini, $250.000; Horn Silver, $2 ,000; Mercur, $311,000; Ontario, $20 ,500; Silver King, $480,000; Sacramento, $10,000; South Swansea, $82,500; Swansea, $55,000; Utah, $4,000. A total of $1,998,-000.

Hercules Gas Engine Works,

Office: 405-407 Sansome St., San Francisco.

Works: — 213, 215, 217, 219, 221, 223, 225, 227, 229, 231 Bay Street.



STANDARD HORIZONTAL HERCULES ENGINE.
Designed to use Gas, Gasoline, or Distillate Oil.
Built in sizes from 4 H. P. to 100 H. P.

The HERCULES Engines of all types are designed with special regard for simplicity, combined with proper arrangement of parts to obtain the very highest efficiency, economy and close regulation. The best of materials, even to the smallest detail; true mechanical design, the best of workmanship and finish; compactness and ease of access for the adjustment and cleaning of all parts. When applying for information be careful to state fully the duty to be performed, and, if possible, the horse power required.

GENTLEMEN:—I have very encouraging reports from my engineer as to the workings of the 25 H. P. Engine you sold us some time ago. He reports that it is perfect in its action, and with all, a very fine piece of machinery. The automatic controller (governor) is so sensitive that they can add or throw out any of the machinery and in all cases the engine responds *instantly*. We cannot say too much in its praise. Engine runs perfectly on 38 gravity distillate oil.

Very truly, W. H. MAXSON.

The HERCULES Stationary and Hoisting Engines are much cheaper to operate than any other make. Read the following:

NEVADA CITY, CAL., Nov. 14th, 1896.

Hercules Gas Engine Works—
San Francisco, Cal.

GENTLEMEN:

In reference to the gas engine hoist you put in the Delaware Mine, I will say that it is giving excellent satisfaction. We are hoisting 50 tons of gravel per day of 24 hours, 400 feet, consuming only three gallons of gasoline.

Very truly yours,
C. H. MALLEN,
Supt. Delaware Gold Mine.

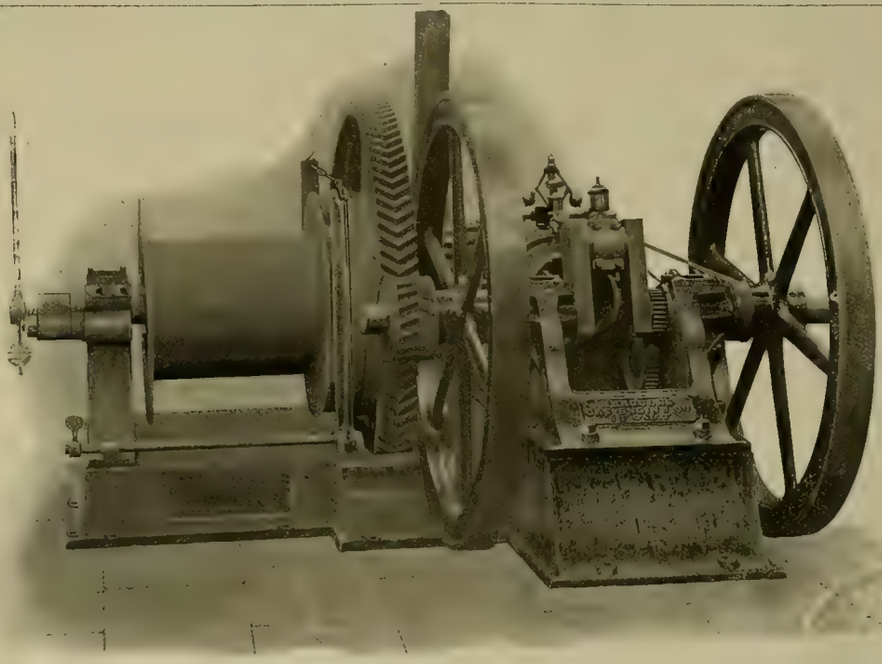
SONORA, CAL., Aug. 24th, 1897.

Hercules Gas Engine Works—
San Francisco, Cal.

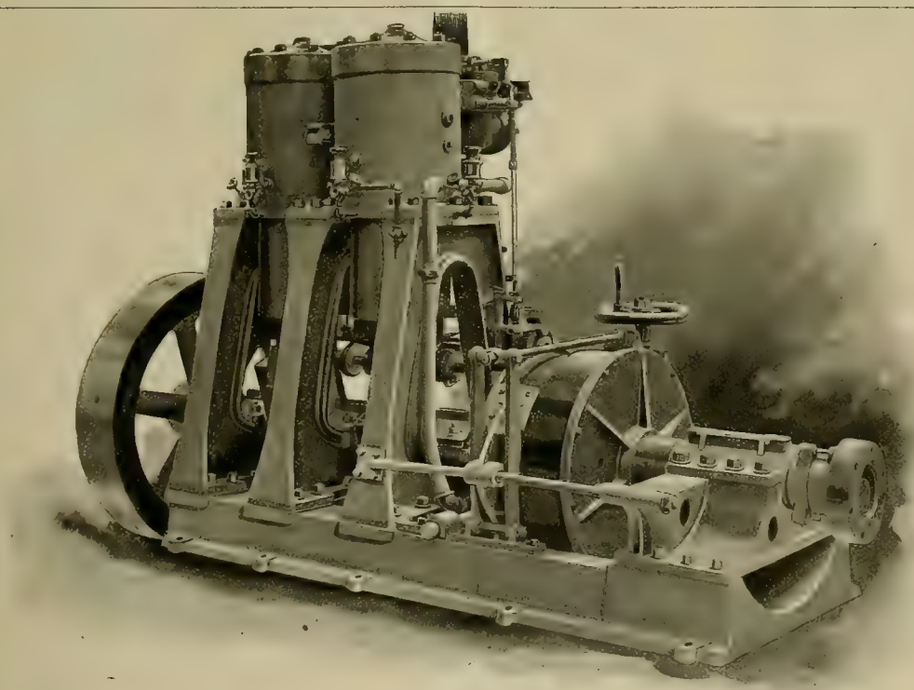
GENTLEMEN:

We purchased from you last year one of your gasoline engines and mining hoists, and, after using it continuously for a year, we are pleased to say that it gives entire satisfaction both as a hoisting engine and pumping plant. Our incline is 200 feet deep, and at this depth the engine performs all that is required of it easily. It has never given us a moment's trouble, and we would recommend any one wishing an economical and efficient hoisting plant to adopt the Hercules Combined Gasoline Engine and Hoist. Wishing you the success which you deserve, in all branches of your business, we remain

Very truly yours,
MUNROE & BIRNEY.



NEW STYLE HERCULES HOIST. Built in all sizes 4 H. P. to 100 H. P. Single or Double Drum Hoists up to 200 H. P. Use Gasoline or Distillate Oil. ENGINES GUARANTEED.



60 H. P. SELF-STARTING HERCULES MARINE ENGINE. Built in all sizes to 200 H. P.

Marine HERCULES Engines are furnished complete with Propeller, Shaft, Tank for Gasoline, and all Fixtures. Sizes 4 H. P. to 200 H. P.

EVERY ENGINE FULLY GUARANTEED.

SAN FRANCISCO, CAL., Dec. 22nd, 1896.

Hercules Gas Engine Works—
405 Sansome Street, San Francisco, Cal.

GENTLEMEN:

After several weeks' trial we wish to express our opinion of the Marine Engine which you placed in our Schooner "Admiral."

Our contract with you called for an engine capable of exerting 30 H. P.; to use distillate as satisfactorily as gasoline; to be self-starting and first-class in every particular.

Our summary of the transaction is that you filled the order promptly, the engine developed about 40 H. P., the self-starting device is a success and fulfills your agreement and your distillate generator is all that you claim for it.

As soon as the engine was installed the "Admiral" began her regular trips to our oyster beds, distant 22 miles, the boat making the run each way inside of two and one-half hours. The dimensions of our boat are 51 feet over all, 20 feet beam and 4½ feet draught.

The engine for the "Admiral" is the fifth we have ordered from you and we are pleased to be able to say that you have made great advances in your engines, especially with regard to your new distillate generator and improved sparking device, with all springs external, the latter point being the greatest improvement, in our opinion, that you have made.

We will be pleased to recommend your engines to any one desiring information on the subject.

Very truly yours,
THE MORGAN OYSTER CO.,
F. C. MORGAN, Secretary.

SEND FOR CATALOG.

Coast Industrial Notes.

—The Merchants and Manufacturers' Association of Los Angeles, Cal., this week opened an excellent exhibit of home products.

—The Chino, Cal., Beet Sugar Refining Co. has bought H. T. Oxnard's interest in the beet sugar factory at Hueneme, including the rights of way, sites, plans, machinery ordered, etc. Mr. Oxnard takes in exchange from the company a $750,000 mortgage on the property, payable next July.

—Work upon the San Joaquin, Cal., Electric Co.'s power-transmission line between Fresno and Hanford, via Fowler and Selma, began this week. Over 100 miles of wire will be used in the line, as three strands will be required to make the circuit. The Construction and Finance Co. of San Francisco have the contract to build the line. Electric power will be sent direct from the power house thirty-five miles east of Fresno, to Hanford, thirty-three miles south of Fresno. The power will be sent over the transmission line at a pressure of 19,600 volts, the electricity will not be utilized at such high voltage, but on its coming into the sub-stations at Hanford and Selma will pass through a step-down transformer.

—The Mexican Government has contracted with the Western Union Telegraph Co. the following rates of charges between the two countries: From any point in the Mexican Republic outside of the free zone to any point in the United States, Canada or British Columbia, $1.75, gold, per message of ten textual words, and 12 cents, gold, for each additional word. From any point in the United States of America, Canada or British Columbia to any point in Mexico where the Mexican Telegraph Co. have an office established, $1.85, gold, per message of ten textual words, and 16 cents, gold, per word for each additional word. To any point in the Republic where said company has no office, $2 15, gold, per message of ten textual words, and 19 cents, gold, for each additional word.

—The Japanese cruiser, Chitose, was launched from the San Francisco works of the Union Iron Works last Saturday. The Union Iron Works received information in the spring of 1895 that the Japanese government was inclined to place an order with the United States for some ships to increase her navy. On August 13, 1895, Mr. Irving M. Scott sailed for Japan to present the claims of San Francisco as a shipbuilding point, and there met Count Ito, Prime Minister of Japan, and Count Saigo, Minister of Marine of the imperial Japanese government, and presented the facts regarding the facilities, etc., existing in San Francisco. February 28, 1896, Mr. George W. Dickie sailed for Japan, as the technical expert of the Union Iron Works, to present to Captain Sassoo, Chief of the Naval Constructors, proof of our ability to design and complete any ship the Japanese wanted. June 25, 1896, Commander N. Miyaoko, Lieutenant S. Takakura and Captain S. Sakurai were appointed a Commission by the imperial Japanese government to examine and report upon the facilities and capacity of the Union Iron Works with regard to its ability to build the battleship. Mr. H T. Scott completed negotiations and signed the contract at Washington, D. C., on December 31, 1896, Minister Toru Hoshi signing for the imperial Japanese government. Captain S. Sakurai was appointed by the imperial Japanese government as inspector of hulls and Y. Wadazakai as inspector of machinery. The first piece of keel was laid on May 3, 1897. The first rivet was driven on June 26, 1897, in the presence of the various Consuls residing in San Francisco, and other distinguished guests. The Chitose is a second-class unarmored protected cruiser to be a part of the imperial Japanese navy. Her dimensions are: Length over all, 405 feet 2 inches; length, load water line, 396 feet; length between perpendiculars, 376 feet 5 inches; breadth, moulded, 49 feet; draught, normal, 17 feet 7½ inches; displacement, 4760 tons; speed, 22½ knots; I. H. P., 15,500; engines, two set, 40—60—66—66—36; revolutions, 150; No. of main boilers, 12. Armament: Two 8-inch quick-firing guns; ten 4.7-inch quick-firing guns; twelve 12-pounder quick-firing guns; six 2½-pounder quick-firing guns; five 14-inch torpedo tubes.

Commercial Paragraphs.

THE Union Gas Engine Co. recently furnished their 10 H. P. "Union" hoists to the Mars gold mine, Forest Hill, the Pine Ridge mine near Jamestown, the Yellow Aster mine, Randsburg. The company has furnished hoists and gasoline engines to thirty-six mining companies in California, Nevada, Arizona, Colorado and Idaho.

THE Gutta Percha and Rubber Mfg. Co., 30 and 32 Fremont street, this city, is manufacturing a drill hose for air or steam, for which much superiority is claimed. The best quality of rubber hose is wound with well-annealed flat wire to withstand great pressure, and the wire will not spring or lose its grasp of hose if cut, an advantage that will appeal to those who have had experience with wrapped hose. It is made in sizes from ½ inch to 3 inches, inside diameter.

THE Randsburg-Santa Fe Reduction Company, of Barstow, California, have placed an order with the Colorado Iron Works Company, of Denver, Colorado, for a 50-stamp mill concentrating plant, including also a complete ore-sampling plant. This mill will be a modern one throughout, and will be completed and ready for operation about the first of May. The Colorado Iron Works Company recently shipped a 10-stamp mill to the Gold Coin Consolidated M. & M. Company, at Springer, New Mexico.

THE Abner Doble Company, San Francisco, is securing a good share of the business occasioned by the general activity in mining circles. It has lately completed several large water-wheel contracts, and is working overtime on rock drills and air compressors. The company is also busy in the supply department, and anticipates a still greater demand when the Klondike business is in full sway. The warehouses are well stocked, particularly in the line of drill steel, iron, picks, etc. This is one of the concerns which cater alike to the prospector and the large mine owner. The mining trade is its specialty.

THE Hercules Gas Engine Works extend a cordial invitation to all visiting mine owners and superintendents to visit their works at 215 Bay street, and inspect the engines under course of building. The company will also be pleased to see any interested parties who may call at their office, 405 Sansome street, near Sacramento. Among several orders just completed by the Hercules Gas Engine Works is a triple cylinder, 45 H. P. Gasoline Engine, which will be used as motive power for the rope tramway at present being erected on Chilkat Pass. The engine is so designed that either two or three cylinders can be used, depending on the work to be done, and has also several other new features tending to economize in the cost of operation and facilitate the highest efficiency being obtained from the least amount of fuel. The company are also building a number of large marine and stationary engines for the Yukon river, and are preparing to build a number of stern wheel boat engines.

THE Pelton Water Wheel Company reports a large run of business for the last two months of 1897. Among the more important shipments may be mentioned: Wheels, governors and connections covering a 2000 H P. plant for San Rafael Paper Mills, Mexico; six wheels for various other localities in Mexico; a 1200 H. P. wheel, with governors and accessories for an electric transmission plant for Petropolis, Brazil—this being a duplicate of their former plant; an electric power transmission plant for Frujillo, Brazil; seven wheels, with governors, pipe lines and accessories, to operate tea and coffee plantations in Java; three wheels for the Ruby mines, in India; two 500 H. P. wheels for operating mills in Tasmania, Australia; three 1000 H. P. wheels, with governors and accessories, for the Yuba Power Co., Marysville, Cal.; one 200 H P. wheel for operating the mill of the Dexter Gold Mining Co., Tuscarora, Nevada: nine wheels for various mining operations in California. A large number of orders are in hand, making the outlook for the present year very encouraging.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JANUARY 8, 1898.

597,456.—BICYCLE BRAKE—L. Bowles, S. F.
597,632.—PROPELLER—A. H. Carpenter, Stockton, Cal.
597,633.—PRUNE DIPPER—F. C. Chapman, Los Angeles, Cal.
597,552.—WAVE POWER—J. M. Dyer, S. F.
597,553.—WAVE POWER—J. M. Dyer, S. F.
597,466.—AIR MOTOR—Hansard & Hiatt, Lebanon, Or.
597,611.—WRENCH—Haye & Humphrey, Pendleton, Or.
497,648.—HOSE NOZZLE—E. D. Kellerman, Montesano, Wash.
597,617.—CONCENTRATOR—C. J. Paine, National Military Home, Cal.
597,565.—GUNCOTTON—C. Quinan, Pinole, Cal.
597,591.—BEDSTEAD AND MANTEL—L. W. Rhoads, San Jose, Cal.
597,482.—SINK STRAINER—A. A. Russell, Grass Valley, Cal.
597,473.—ACCOUCHEMENT CHAIR—Sarah Swain, Los Angeles, Cal.
597,630.—THRESHER—W. T. Wilkins, Grimes Landing, Cal.
597,450.—GOLD SEPARATOR—J. M. Wishart, Oakland, Cal.
597,451.—TOOL HANDLE—H. A. Zeckendorf, Tucson, A. T.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Personal.

R. L. DUNN returned this week from Siberia, where he has been examining some hydraulic mining property.

W. H. STORMS has interested capital in the Good Friday mine on Yost ranch, near Soulsbyville, Tuolumne Co., Cal. In future it will be known as the Agnes, and will be thoroughly developed.

E. M. WADE, of the firm of Wade & Wade, Los Angeles, Cal., is witnessing the Jubilee and the mining exhibits. He has bought a complete milling outfit for milling ores, to be set up in Los Angeles, which will be the only mining machinery in full operation in the city. It consists of a stamp mill, a concentrator and cyanide works, and with it he expects to operate the cyanide process either by zinc precipitation or by electrolytic process.

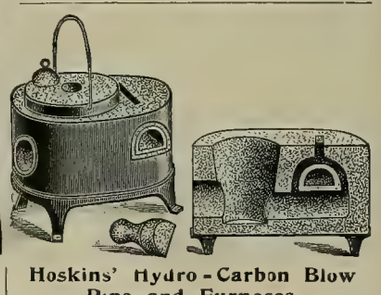
Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

WAVE POWER.—James M. Dyer, San Francisco, Cal. No. 597,553. Dated Jan 18, 1898. This invention relates to a means for applying the motion and power of the waves and transmitting it into a continuous rotary motion. In the present apparatus a float is made adapted to rise and fall with the movement of the waves, and this float is secured by a single anchor extending outwardly from the shore. A single rope extends from the float diagonally to a stationary mechanism on the shore so that the forward and backward and also the rising and falling movement of the float are conjointly utilized for the transmission of the power to the rotary apparatus.

PROCESS OF MAKING GUN COTTON.—Clarence Quinan, Pinole, Cal. No. 597,565. Dated Jan. 18, 1898. This invention relates to improvements in the manufacture of gun cotton from hydro-cellulose. The object of the invention is the preparation of an improved and purified hydro-cellulose with a view to a corresponding improvement in the quality of the resulting gun cotton. The process serves to remove the mineral matter, which amounts to from 1 to 2 per cent in the ordinary cellulose fiber, which is available for the manufacture of gun cotton and to nitrate all of the cellulose, where in other processes from 1 to 5 per cent remains unnitrated. In this process the mineral matter is removed so that the hydro-cellulose is nearly or quite free of ash and the waste product of factories where the high explosives is utilized in the process, which greatly cheapens it.

WAVE POWER.—James M. Dyer, San Francisco, Cal. No. 597,552. Dated Jan. 18, 1898. This invention relates to a mechanism for utilizing the power produced by the rising and falling of a vessel or float upon the waves. It consists essentially of a vessel or float having a suitable mechanism mounted upon it, means for anchoring the vessel or float to a fixed point which serves as a fulcrum about which it rises and falls, a second rope or cable so connected with the anchoring cable or fixed point that the alternate slacking and extension of the anchoring cable will transmit motion through said rope to mechanism mounted upon the vessel through which the alternate reciprocating movements are transformed into a continuous rotary movement.

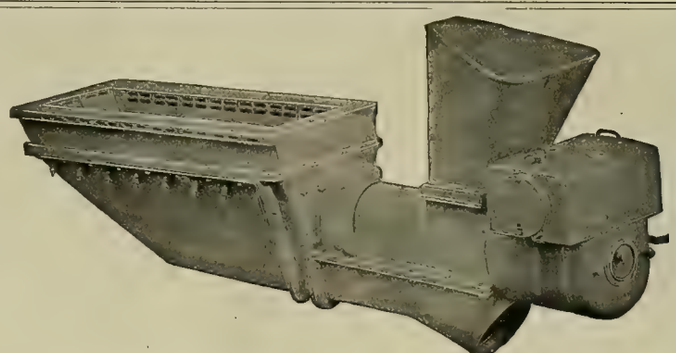


Hoskins' Hydro-Carbon Blow Pipe and Furnaces.

It has been more than fourteen years since Mr. Hoskins first introduced his Hydro-Carbon Blow Pipes and Furnaces to the assaying public, and though it was at first up-hill work to convince those interested that the use of gasoline was not attended with danger, and that his apparatus was practical, it will be admitted by all now that his appliances have not only revolutionized the practice of assaying in regard to the furnaces used, but the mining public has been materially benefited.

It is also a fact that during all this time he has had no successful imitators. This is no doubt due to the determination on his part that his Furnaces and Blow Pipes shall always be the best for the purpose, and he has always been ready to meet any reasonable demand on the part of the user.

His firm is still occupying this position, and by addressing Messrs. Wm. Hoskins & Co., 81 So. Clark St., Chicago, with a request for their new catalogue, full description and prices will be found of new designs and types of Furnaces, including Combination and Portable Furnaces, such, for instance, as that above illustrated. It might be well in this connection to add that Mr. Hoskins has just been allowed protection on his new Combination Furnaces by letters patent, No. 596,707—issued January 4, 1898. *



The American Stoker.

The American Stoker, illustrated herewith, is claimed to be a practical exemplification of the new theory of underfeeding coal to a boiler in such a way as to produce perfect combustion and thus economize in the use of fuel as well as obviate smoke. By the process of feeding the coal from below and the introduction of a sufficient amount of air, the volatile gases are released below the fire, the coal is burned as a coke and the released gases consumed as they pass upward through the bed of glowing coke. The non-combustible material is left in the form of a vitrified clinker.

Immediately beneath the coal hopper, and communicating with it, is the conveyor, this in turn communicating with the magazine in direct line with it. A screw conveyor or worm is located in the conveyor chamber, and extends the entire length of the magazine. Immediately beneath the conveyor chamber is located the wind box, having an opening beneath the hopper. At this point is connected the piping for air blast. The other end of the wind box opens into the air space between the magazine and outer casing or envelope. The upper edge of this magazine is surrounded by tuyeres or air blocks, these being provided with openings for the discharge of the air blast. Beneath, and in front of the hopper, is located the motor for operating the stoker. The only moving parts of this motor are the reciprocating piston and rod. The piston rod carries a crosshead, which, by means of suitable connecting links, operates a pawl mechanism, which, in turn, actuates the ratchet wheel mounted on the conveyor shaft. The space on each side of the stoker, between the tuyere blocks and the side walls of the furnace, is occupied by dead plates or air-tight grates. The coal is fed into the hopper carried by the conveyor into the magazine, and is there forced upward, "overflowing" on both sides, and spreading upon the dead grates the entire width of the furnace. The entire mass of coal above the tuyeres and all of that upon the dead grates is ignited, carrying a bed of burning coke from 14 to 18 inches in depth.

The manufacturers, who recently moved their plant from Dayton, Ohio, to Brooklyn, New York, have established a Western agency at 1116 Seventeenth St., Denver, Colo., with Mr. F. Wallaker in charge. This Stoker is in successful use in one of the large hotels and two of the smelters of Colorado.

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The Fair will contain practical exhibits and demonstrations of quartz, placer and all other methods of mining, and mining machinery. Complete working plans of the North Bloomfield mine will be in operation on a large scale.

In connection with the Fair there will be a complete Klondike outfitting exhibition, together with Klondike cooking lectures and practical demonstrations of packing supplies over the trails by horses, burros and men; also the methods of transporting these supplies across the lakes and down the Yukon river to Dawson.

Transportation Over the Chilkoot Pass.

Within the next few months will set in, from all parts of the globe, a heavy tide of travel to the Klondike. The all-water route via St. Michaels and the Yukon presents the least discomfort to the traveler, with the great drawback, however, that the destination can hardly be reached before July 1st. The most direct and otherwise feasible route is by way of Dyea and the Chilkoot, and the bulk of the travel will probably tend that way. In the issue of October 23, '97, was mentioned the fact that the Chilkoot Railroad & Transport Co. of Tacoma had entered into a contract with the Trenton Iron Co., through their San Francisco agent, Mr. Newton M. Bell, for a Bleichert wire-rope tramway to be erected through a portion of the Dyea canyon and over the Chilkoot pass to Crater lake, the most southerly of the chain of lakes connecting with the Yukon. The inception of this enterprise dates from the early part of last September, when a party of surveyors under the direction of A. McL. Hawks of Tacoma, Wash., made a complete topographical survey of the ground and determined the most feasible route for the proposed tramway. The company selected the improved Bleichert system built by the Trenton Iron Co. That company has erected and put in successful operation some long and difficult lines, among which are the twelve-mile tramway on the island of Hayti, the Macate line in Peru with its extraordinary fall of 4920 feet in a total horizontal length of 10,450 feet, and lines in Colorado, where practically the same difficulties were presented as at the Chilkoot.

The Chilkoot line was planned to be built in two sections, the first, extending from Canyon Camp to Sheep's Camp, a distance of four miles, the second, from Sheep's Camp to Crater lake, a distance of three and one-half miles. The first section is now so far advanced on the ground that its early opening for business is practically assured. In connection with the tramway, is a surface road, running from tide-water along the Dyea river and through the Dyea canyon, so that, with the completion of the two sections of the tramway, the entire distance from Dyea to Crater lake will be covered by an uninterrupted line of transportation. It is probable that by another season the tramway system will be extended to Lake Lindemann, the head of lake navigation.

The tramway is of the Standard Bleichert type, but with modifications to secure minimum lightness with the same factor of safety; smaller cables and ropes are employed, but made of "plough" steel of higher tensile strength than steel ordinarily used in cables, and many of the castings, usually of iron, are made in lighter patterns, of cast steel.

In this way the total weight was materially reduced, and with it the cost of transportation and erection. Herewith (Fig. 1) is an illustration of a typical Bleichert tramway, showing the line at the Royal Coke and Coal Co.'s mine, in West Virginia, which gives a general idea of the Bleichert system.



FIG. 1.—BLEICHERT TRAMWAY OF THE ROYAL COAL MINE, WEST VIRGINIA, SHOWING SPAN OVER NEW RIVER—DAILY CAPACITY 800 TONS.

In this system of aerial transportation, the loads are suspended from carriages which run on stationary cables, and are moved by a light endless traction rope to which they are attached, and which travels continuously about terminal sheaves. This is the general distinguishing feature of the system and has led to its being known in many localities as the "double-rope" system. The usual style of supports are wooden framework structures, but at the Chilkoot single iron poles firmly cemented into rock are used. These poles carry cross-arms, on either side of which are saddles which support a double line of track cables, over which run the grooved wheels of the carriages. Lower down on the supports are other cross-arms with carrying rollers upon which the moving traction rope runs. In the Chilkoot Pass section of the line eighty of these supports are used, their height ranging from 13 to 25 feet, placed at varying distances according to the contour of the ground, the longest single span being 1600 feet. As the loads will generally travel from a lower to a higher elevation, power is required to operate the line, which will be provided at Sheep's Camp by a high-speed engine and sectional boiler of about 45 H. P. One angle or turn station occurs in the line, and two tension stations where the main cables are parted and the proper tension is maintained by means of weight boxes. The ordinary tramway car, such as used for transportation of ore, is shown in the accompanying illustration (Fig. 3).

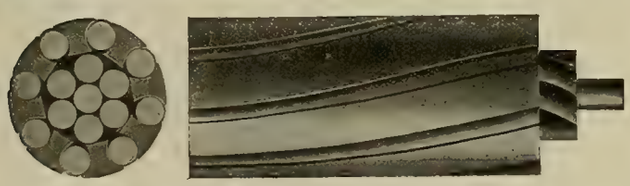


FIG. 2.—LOCKED-COIL TRACK CABLE.

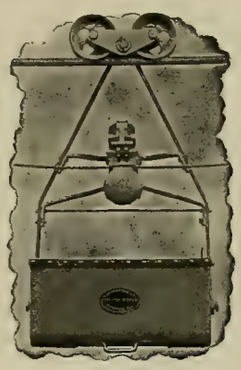


FIG. 3.—TRAMWAY CAR.

The complete car, it will be observed, consists of a carriage which runs on the track cable, a hanger depending from which supports the bucket and a grip, by means of which the car is attached to the traction rope. When the car arrives at either terminal, or other station, the grip detaches automatically and the carriages are switched off from the cable and onto shunt rails. By means of shunt rails the carriages are led around to the opposite cable, thus making the system continuous.

The illustration (Fig. 2) shows the details of the locked-coil cable used for carrying the suspended loads, in which it will be noted that the outer wires are of such shape that they interlock and present a smooth surface, corresponding to that of a solid cylindrical rod.

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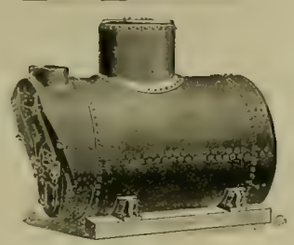
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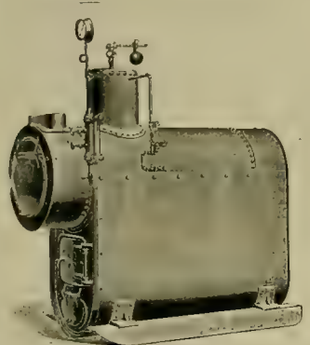
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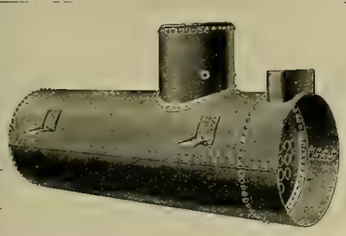
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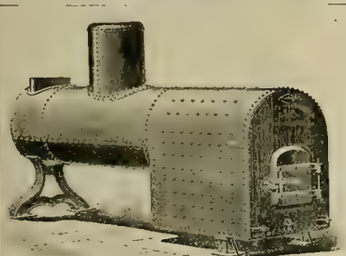
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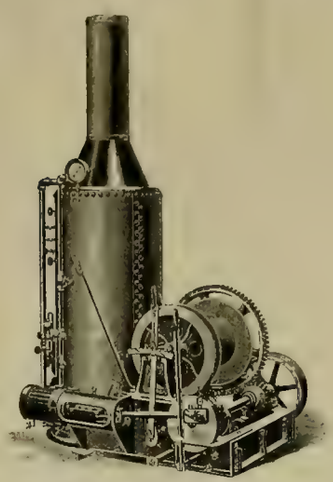
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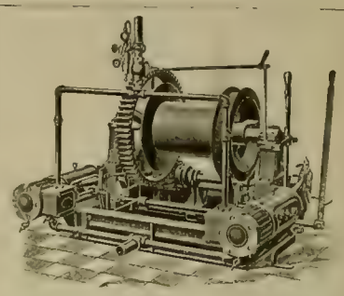
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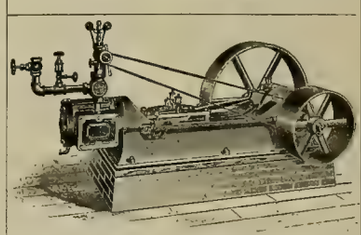
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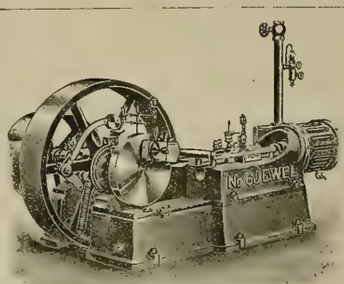
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Early Mining and Milling Methods in California.

Written for the MINING AND SCIENTIFIC PRESS.

In the year 1850–'51 two brothers (Frenchmen), bearing the somewhat English surname of Winter, located two mining claims on the outcroppings of a white quartz ledge one-half mile north of the lively town of Angels Camp, Calaveras county, on the road leading to Altaville. As memory serves, these claims were each 450 feet in length, as prescribed by the then existing mining laws of that district. This bold outcrop of the ledge standing prominently above the road, about midway between these two mining camps, was called in those early days "the white quartz blowout," and forms to-day a part of what is known to all the mining world as the "great mother lode of California." It is an interesting fact that these locations were made about 2000 feet northerly from the northern boundary line of the now famous "Utica mine of Calaveras."

In 1852 the Winter brothers began opening their claim by driving an open cut across and along this outcrop or blowout, following the primeval method of mining then in vogue in nearly all the mining districts of California. To reduce the quartz from their mine to bullion they built two arrastras after the aboriginal pattern, the propelling power being two mustangs, a man and presumably a whip. That the ores thus extracted must have contained "pay," that this crude milling outfit must have been successful in its working, that the clean-ups must have been fair, is demonstrated by the fact that in 1854–'55 they erected a 12-stamp mill driven by an overshot wheel 30 feet in diameter, taking its necessary water through a flume leading from a ditch, then owned by the Union Ditch Company, which in its turn took its water from the Stanislaus river far above the Big Tree grove of Calaveras. This undertaking, in those days of high prices for everything, must have been expensive, but the cost was paid from out of the earnings of the two arrastras, and it was surmised that a handsome balance remained to the credit of the two brothers in the Bank of France.

It is to the peculiarly primitive construction of this stamp mill that the writer desires to call attention—"to point a moral and adorn a tale,"—to compare the style of the quartz mills of the '50s with the "up-to-date" mills of the present. The description is from memory of more than forty years.

The driving power was derived, as previously stated, from an overshot water wheel, 30 feet in diameter, geared to the battery cam shaft driving the twelve stamps, which were distributed in two batteries of six stamps each, there being two iron mortars arranged for dry-crushing the ores.

The cam shaft was formed from a round wooden log of sufficient length to extend from its gearing to the wheel, across the full length of the two batteries, substantially supported in rough, cast-iron arm boxes, and fitted with short, one-arm, iron cams, set in the shaft at regular intervals. The stamps were framed of hard wood, 8 inches square, fitted with projecting collars, answering the purpose of our present tappets, and by which they were lifted in the successive revolutions of the cam shaft and cams. The lower ends of these stamps, or, more properly, stems, were fitted with square plates or shoes of cast-iron, 4 to 6 inches thick, and corresponding square dies were fitted closely in the bottoms of the mortars, and, being intended for dry crushing, the bottoms were placed flush with the battery floor.

The open cut from which the ores were mined was about 300 yards distant from the mill, and the ores were transported in cars over a rude tramway of wooden rails leading thereto, and were dumped on the floor back of the mortars, where they were broken into suitable fragments and fed by hand into the mortars under the stamps, automatic ore feeders not then having been dreamed of nor conceived.

The fronts of the mortars were made open, in order that the crushed ores might be discharged on to the battery floor, and from the accumulating piles the ores were shoveled on to inclined screens of suitable mesh, after the fashion of the ordinary coal screens, the coarser fragments being re-shoveled under the stamps for further pulverization—certainly a tedious process as compared with the present automatic methods of handling ores.

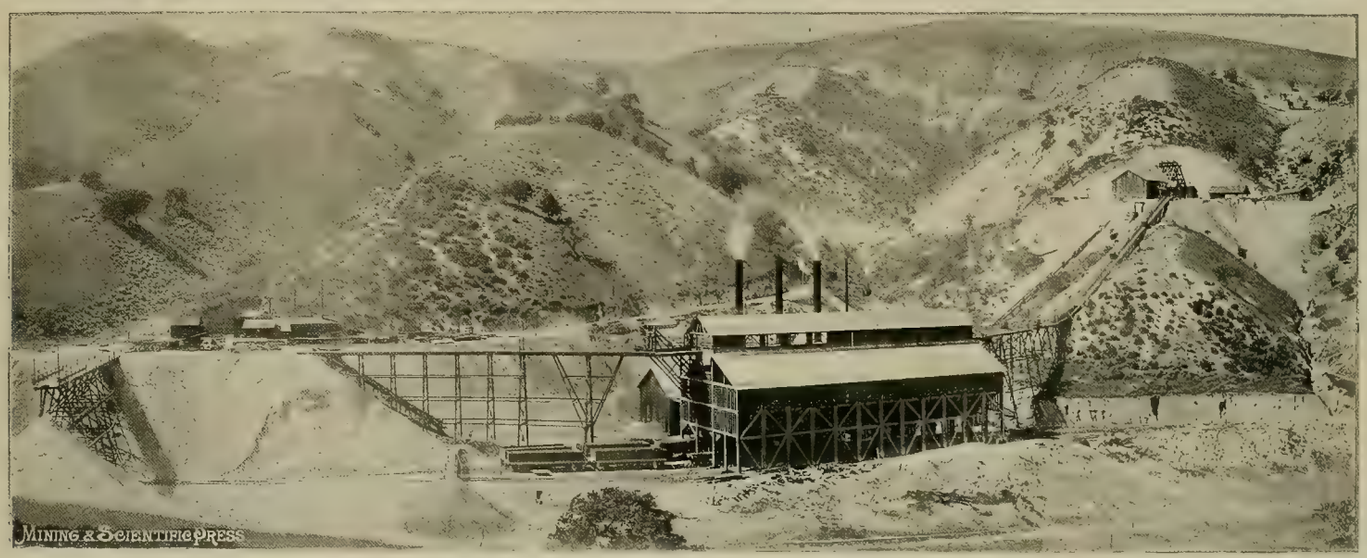
To the main, or battery, portion of this mill building were two annexes, one on each side. In the larger annex six arrastras were originally placed, and three in the smaller; subsequently six others were added, making a complement of fifteen, all being driven by a rough and complicated system of gears and pinions from the ponderous, clumsy, overshot water wheel. The screened ores were wheeled in barrows from the battery room and dumped in piles conveniently near each of the arrastras, whence they were again shoveled into the arrastras, as the huge stone drags keep up their ceaseless, unremitting round of grind, grind, grind, until complete pulverization and amalgamation of the ores were effected.

During the writer's superintendence of this queer milling plant, samples of the dry screened ores were taken from the several piles generally twice, sometimes four times each day, and panned or horned; if the horns showed plenty of colors, the runs were continued usually six weeks; if the colors were few and far between, the runs were longer. The work of cleaning up these fifteen arrastras was a job to be dreaded. They were literally to be torn to pieces and rebuilt. There was amalgam everywhere; all of the participants were besmeared with it—dirty and disagreeable.

Let us for a moment institute a comparison between the methods of then and now—note the difference between this huge 30 foot overshot wheel and the present compact hurdy gurdy of the Pelton form; look at the wooden cam-shaft and the square wooden stamps, crushing but little more than half a ton per day, and compare this with the trim stamp mills of to-day, with their stamps, weighing from 700 to 1200 pounds each, dropping from 75 to 110 times per minute and crushing from two to three tons per day.

Look at the labor of breaking the ores by hand and then on the ore crushers now in use; consider the feeding by hand and the automatic work of the ore feeders of the "Challenge" type; note the slow process of wheeling the crushed ores to the arrastras and the tedious drag, drag of the arrastras as compared with the present system of amalgamation in our "up-to date" stamp mills, and subsequent concentration of the valuable metallic particles by the intervention of concentrators of the "Triumph" or "Frue" style—and all of these improvements have come to pass through the inventive genius of Californians; and in this year of our Golden Jubilee may we not thank God with grateful hearts that when this "land of gold" came as a suitor for State sovereignty that she was marshalled with a glad welcome into the Union of these United States of America.

R. B. NOYES.



CORRAL HOLLOW, CAL., COAL MINES.

Coal Mines at Corral Hollow, Cal.

Production of a good quality of coal in California, especially in the vicinity of San Francisco, would be of benefit to manufacturing interests here. The money expended annually for coal which is shipped here from all parts of the world would remain here and help to develop the great resources of this State.

The coal mines at Corral Hollow, Cal., have been developed to such an extent in the past few years that a description of them will be of interest. The mines are in Alameda county, twelve miles from Livermore, fifty miles from San Francisco. They cover from six to eight square miles, and over the entire territory extensive prospecting has been carried on for several years, with the result that good quality of coal has been discovered in commercial quantities. The San Francisco & San Joaquin Coal Co. have fitted up a plant at Corral Hollow, most of which was designed in the office of Messrs. Cobb & Hesselmeyer, consulting mechanical and hydraulic engineers, of San Francisco. A comprehensive view of the entire plant is shown by the accompanying illustration, engraved from a photograph taken by Mr. Hesselmeyer.

The hoisting works, which consist of a pair of direct acting Corliss hoisting engines of approved construction, are located on the hill on the extreme right of the picture, and the gallows frame close by stands directly over the inclined shaft. The shaft is 11x22 feet, divided into three compartments, two of which are used for hoisting coal and the other for pumping. The cage by which the cars are hoisted is of novel design, and discharges the cars (three in number) automatically as they reach the surface. From here the cars are run on a rope tramway down to the top of the main bunkers, where they discharge automatically in any desired section of the bunkers, after which the empty cars are returned to the top of the hill. The main bunkers, which are 105 feet below the hoisting works, are 72 feet wide by 145 feet long, and 50 feet high from the ground to the level of the tracks. They have a capacity of 2000 tons of lump coal. The coal, upon being discharged from the cars, falls upon screens, which separate the lump from the fine material, which then fall by gravity to their respective places. They are arranged over four railroad tracks and cars can easily be loaded with lump coal, screenings or intermediate sizes, as desired.

The railroad which runs from the mines to Stockton is about forty miles long, and is considered by engineers to be one of the best constructed roads in California. All the coal is shipped over it from the mines to Stockton in patent bottom-dumping gondola coal cars, each of about thirty tons capacity. On arriving at Stockton the entire train is run on top of the bunkers located at tidewater, which have a capacity of 2000 tons. They are 42 feet wide, 200 feet long and 38 feet to top of rails, and are fitted with automatic discharging devices for cars on one side and steamers on the other.

The boiler plant at the mine, which supplies steam for the hoisting engines, electric light plant, air compressors, etc., is located directly back of the main bunkers and consists of six horizontal tubular boilers of about 500 H. P., contained in a well-constructed building 48x130 feet. The main steam pipe is carried by the most direct course to the engines, and the exhaust steam is returned by a 14-inch pipe to the condensers, which are located down near the boiler house. These condensers consist of a series of manifolds laid horizontally, over which the cooling water flows, and the water is used over and over again. It is cooled on a number of large cooling trays, which consist of two sets of corrugated iron trays, three in each set, and are each about 16 feet wide and 85 feet long, placed one above the other and at such an angle that the water runs from one to the other, and is thereby sufficiently cooled. A centrifugal pump returns the hot water to the top of the cooling trays for a repetition of its work.

The main tunnel is 10x10 feet, and is located on the extreme left of the illustration. It has been run in for a distance of about 3000 feet. Several large and distinct veins of coal have been cut through. Some of these are being worked, and the coal is delivered to the bunkers previously described. It is believed when the mines are working up to capacity that about 1500 tons of coal can be shipped daily.

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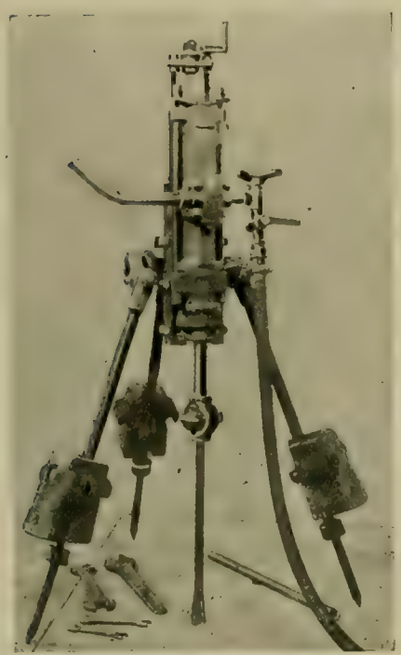
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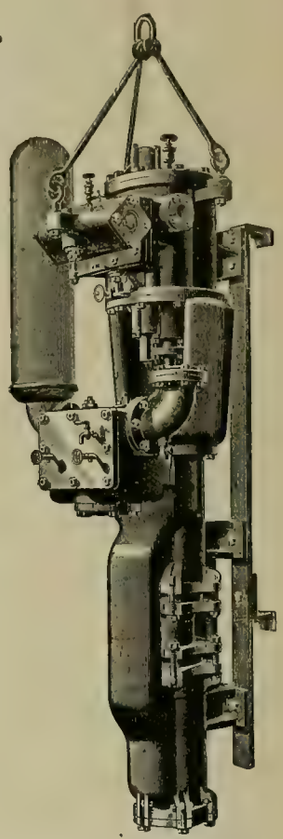
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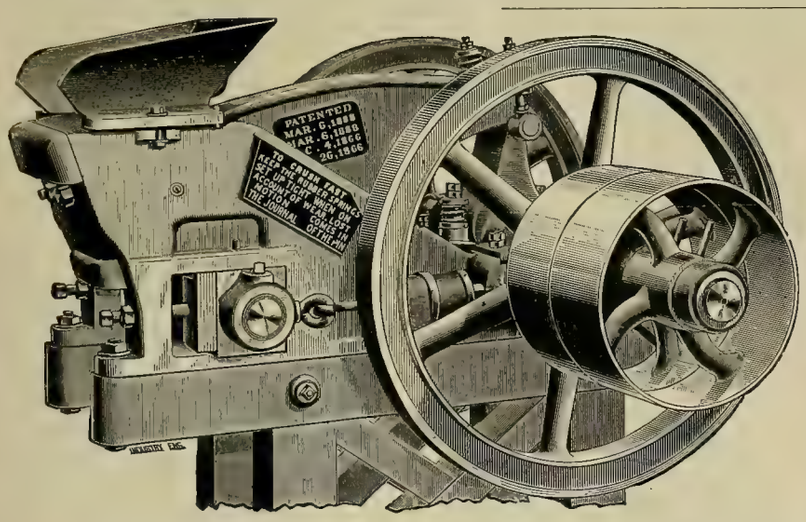
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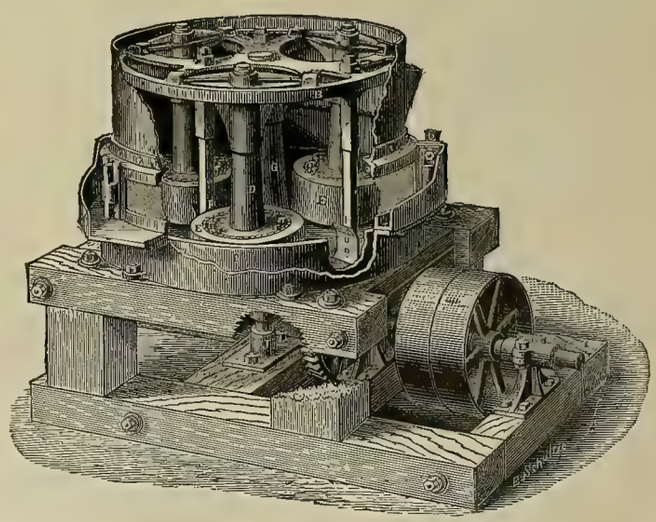
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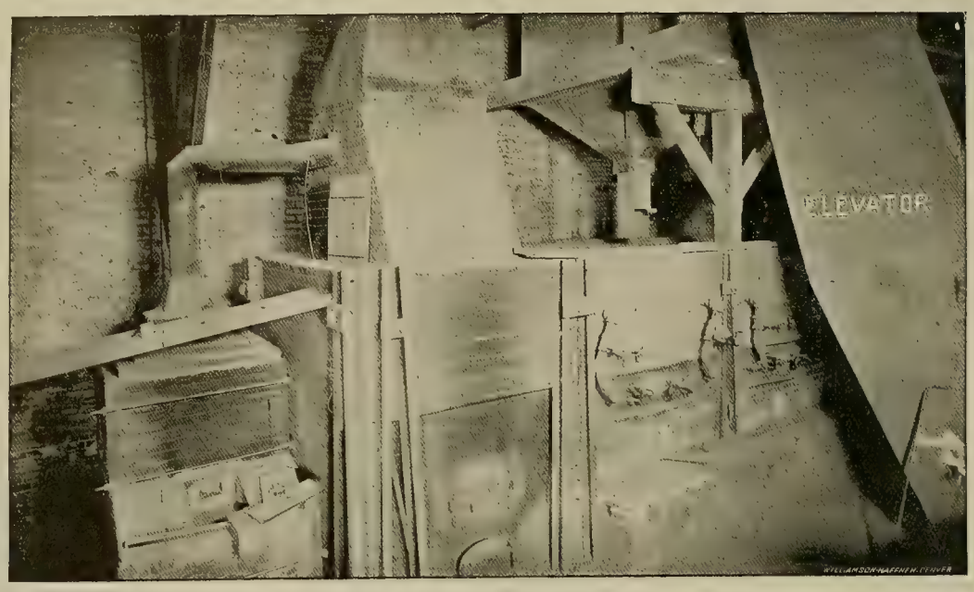
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Successfully and economically treats Tellurium, Sulphide and Pyritic Ores, saving the values up to 90 and 95 per cent. . . .



The ores, mixed with fluxes, are roasted in air-tight muffles, whereby sulphides are converted to sulphates and reduced to proper form for amalgamation. The gold is set free.

By the BEAM Method it is possible to treat refractory ores profitably whose values are as low as $4 per ton. Experiments made at our Denver mill prove every statement we make. They demonstrate that the cost of treatment does not exceed $2 per ton with furnaces having a capacity of twenty-five tons per day. Our experiments prove that the BEAM Roasting and Converting Process is adapted to the treatment of all refractory ores with the exception of lead carbonates.

AN EXPERT REPORT.—The following from Chas. Gibson, D. Sc., a metallurgist of unquestioned character and ability, is the result of his investigations for outside parties:

DENVER, COLO., Sept. 18, 1897.

Mr. Geo. B. Dodge, Denver, Colorado.—DEAR SIR: Pursuant to request, I beg respectfully to submit my observations, as viewed from a scientific and technical standpoint, on the "Beam Gold and Silver Process."

Up to the time of my arrival in Denver I had not even heard of the "Beam Process," and my surprise may be imagined when I heard claims made for this process which were inconsistent with all rules of metallurgy. I heard charges frequently and freely made that in some way, either by manipulation of the fluxes used, or by "ways dark and devious," the wonderful recoveries made by the process were brought about.

Being interested in refractory ores, I, therefore, determined to investigate. I was given free access to all parts of the works, and found that there were no secret or locked rooms where such manipulations might be made. Without letting my object be known, I was there daily, all the time, and finally found that too much had not been claimed for this process, but that the principles involved in treating ores by this process were so simple as to cause my utter amazement. Prof. Beam, it is true, has not invented a new science. He has simply made an observation and turned it to practical account for the purpose of extracting the metal values from the ores at a nominal cost.

The observation made by Prof. Beam is simply this: that where high heat is used in roasting, the sulphur is burnt or consumed as fast as it is liberated by the heat, and generates intense heat by reason of this combustion, which causes the particles of iron, etc., enclosing the metal values, as well as any free metals, to sink into a smaller and more compact form. As a result of this condition, the iron particles, etc., are brought closer together and converted to a hard, compact oxide, or, as before stated, into a smaller and more compact mass than when raw ore was first placed in the muffle. He then found that if he kept his heat very much lower, that instead of the particles of iron oxide getting closer together and denser, they became, as the sulphur was driven off, less compact, larger, and very friable, and were easily reduced to an impalpable powder by simply rubbing between the finger and thumb.

After fifteen years of unremitting patience and perseverance, and by painstaking work, Prof. Beam has succeeded in turning this simple observation to practical account for the treatment of refractory ores, whereby he is able to recover their metal values at a small cost. After patient investigation, Prof. Beam found that to attain this result, he must very seriously reduce the access of air to the mass of ore, especially at the beginning of the operation, for, if the air had free access to the ore at this stage, it combines with the sulphur as fast as it is set free by the heat, thereby generating an intense heat, which brings about the very conditions which he wishes to avoid; that is, the vitrifying of the comcounds and enclosing the values in a sort of cement. Hence, the use of a muffle furnace with air-tight doors, which places the ingress of air at all stages under the control of the operator.

I will now describe a little more in detail the furnace and the chemical changes which take place during the entire operation of this roast, or conversion, as it ought properly to be called.

The ore to be treated is ground dry by any suitable mill to about 40-mesh and placed on top of the furnace to expel the moisture. It is then run through an opening for the purpose, which communicates between the floors on the top and the muffles, and which is closed immediately after the ore has been introduced into the muffle. The doors on the side are fitted with ground joints, and are screwed tight as soon as the charge is introduced, so that the air, to all intents and purposes, is completely excluded. The furnace has been previously heated to such a temperature as it is found will decompose or split up the iron pyrites (FeS_2) (for we will confine ourselves for the present to this substance) into ferrous sulphide and free sulphur ($2\ FeS_2 = 2\ FeS + S_2$), as well as to volatilize the free sulphur as fast as it is formed, and expel it in a gaseous form through openings left in the arch of the muffle for that purpose, into the chimney flue, where it meets with the excess of air which has passed over the fire used for heating the muffles, and is there burnt, and by this heat thus generated, assists in heating the muffles, and thereby economizes fuel, and, of course, the creation of a high heat inside the muffle is effectually avoided. At this stage a current of hot air is forced through pipes into the muffles, over the ore, which if stirred from time to time, and the remainder of the sulphur is either burnt slowly off and ferric oxide (Fe_2O_3) is formed, and the oxygen combines with the ferrous sulphide, making it into ferrous sulphate ($FeSO_4$) and persulphate of iron ($Fe_2\ 3\ SO_4$) approximately according to the following equation:

$$9\ FeS + 19\ O = 1\ Fe_2\ O_3 + 2\ FeSO_4 + Fe\ 3\ SO_4 + 3\ SO_2.$$

The ore is now ready to draw and the iron oxide will be found to be very friable and easily reduced to a powder, while the sulphates can be leached out, and the values are found to be free and capable of being recovered by amalgamation. If copper and zinc be present, they are for the most part converted into sulphurets and can be leached out and recovered as by-products, if necessary. Silver is partly converted into sulphates and partly remains as sulphides, in either of which conditions it is recoverable. Arsenic, antimony and other metals are converted into harmless metals, or are volatilized.

It will readily be seen that the ore has been increased in weight, for while in eight molecules of pyrites, which contains sixteen atoms of sulphur, eight are lost, while thirty-eight of oxygen have been taken up. Multiplying eight by thirty-two (the atomic weight of sulphur), we have two hundred and fifty-six, representing the weight of sulphur lost; again, multiplying thirty-eight by sixteen (the atomic weight of oxygen), we have six hundred and eight, representing the weight of oxygen gained.

The claim, therefore, that the ore increases in weight by the roast, is sustained, if the chemical reactions as stated above actually occur, and it is a fact, as I have proved, that ferrous sulphate and persulphate of iron are actually present in the roasted ore before leaching, in about the proportions given in the above equation. There are a great many men who, hearing of something being done which is not in accordance with the rules of practice which they are accustomed to follow, without taking the slightest trouble to investigate and find out the truth, take upon themselves to criticise, condemn and stamp as a charlatan an humbug the party who has accomplished the deed. A great deal of abuse has been heaped upon Prof. Beam in consequence of his having claimed that he can and does regularly recover over 100 per cent of the fire assay of the raw ore. These ignorant detractors of Prof. Beam measure by false standards. One of these standards is the present method of fire assay. Now, as everybody knows, the present method of making a fire assay is notoriously incorrect, and gives incorrect results, especially for sulphide and tellurium, or other refractory elements. It would seem, then, that the results obtained by a fire assay are hardly suitable to use in order to condemn a process which claims to be able to get more than the fire assay, because it is evident that the process may be right and the fire assay wrong.

Then, is the roaster of the smelter a proper standard? Why, every metallurgist knows that immense amounts of value are daily lost by volatilization by these roasters. The roaster of a smelter can never be a standard of measure, or rather a limit to the recovery made by a competitive process. Prof. Beam does not claim to increase the gold in an ore—he does not claim the ability to ripen "green gold," but he *does* claim that all the gold originally in the ore is made free and recoverable, and this is being done by him daily.

No improvement, it must be borne in mind, has been made in the method of the fire assay for over a century, but the "Beam Process" already points in directions and to means whereby the value of some ore at least (if not all) may be more approximately ascertained.

It will be readily understood, where a reduced temperature is used, the cost of roasting will be very much reduced, especially as a roasting by the "Beam Process" requires but a fraction of the time required by the reverberatory furnace of the smelter. The why and wherefore for requiring so much less time is that the heat created at first in a reverberatory furnace, by the free admission of air, is so intense that the sulphur is burned as fast as it is liberated, and fuses or vitrifies the compounds and covers particles of undecomposed ore with a sort of cement, which requires intense heat, coupled with long exposure to the action of hot air, to effect their decomposition; whereas, in the "Beam Process," no fusion or vitrification takes place. The particles do not become coated with a cement-like substance, but are accessible to the free action of air, when the proper time has arrived for its free admission, and the chemical changes are effected in a comparatively short time and the gold values are freed and made easily recoverable. I am, dear sir,

Yours respectfully,
(Signed) CHAS. GIBSON, D. Sc.,
Chemist and Metallurgist.

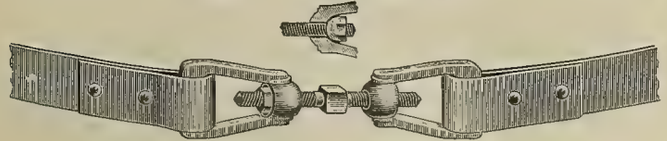
Send for pamphlet giving result of twenty-five tests made at our Denver mill for twenty five different parties, of ores which first passed through the public sampler to determine their values. This advertisement is for the purpose of courting an investigation as to actual results.

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CALIFORNIA OFFICE, Los Angeles, Cal.
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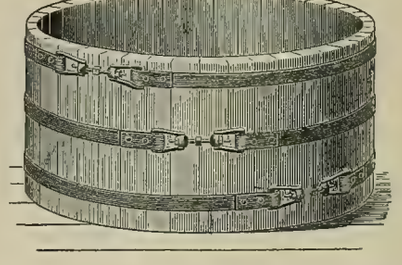
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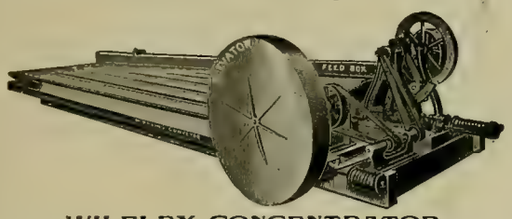
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Board and Room per day, $1.00 to $2.00. Board and Room per week, $6.00 to $12.00. Single Rooms, 50 cts. to $1.00. Family Rooms, $1 00 to $1.50.

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Gold Medal, Columbian Exposition, 1893.

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New Apparatus in an Old District.

Written for the MINING AND SCIENTIFIC PRESS.

All old timers will readily recall the Cariboo gold excitement of 1862. But that was thirty-six years ago, and many of the younger generation know but little about it.

It is yet a question whether the rich creeks recently discovered on the Klondike and the Yukon will outrival the rich creeks of Cariboo. It is a matter of history that from two small creeks alone, viz., Williams and Lightning, over forty millions in gold was taken out during the first five years after their discovery, and that, too, from a stretch of less than three miles on each creek. This gold was all taken out by the drifting process, and unlike the frozen creeks of the Klondike, great volumes of water had to be pumped to the surface, at considerable expense while the work of drifting was carried on near the bedrock. The rich strike on Williams creek in the fall of 1861 caused a stampede to the north in the following spring, similar to the present rush to Klondike. The sufferings and hardships endured along those trails and through the rough and dangerous canyons of the Fraser river was something never to be forgotten by those who went to Cariboo in the spring of 1862.

The writer speaks from experience, for he was one of the multitude that sailed from San Francisco, early in the month of June, '62, for Victoria and the Fraser river, there to take up the march for the new El Dorado. Many thousands went and almost as many returned the same year poorer but wiser. A sufficient number remained, however, to operate the mines and many fortunes were quickly made, several camps or towns were built up; the most important, Barkerville, on Williams creek, and Stanly, on Lightning creek, yet remain and do quite a business.

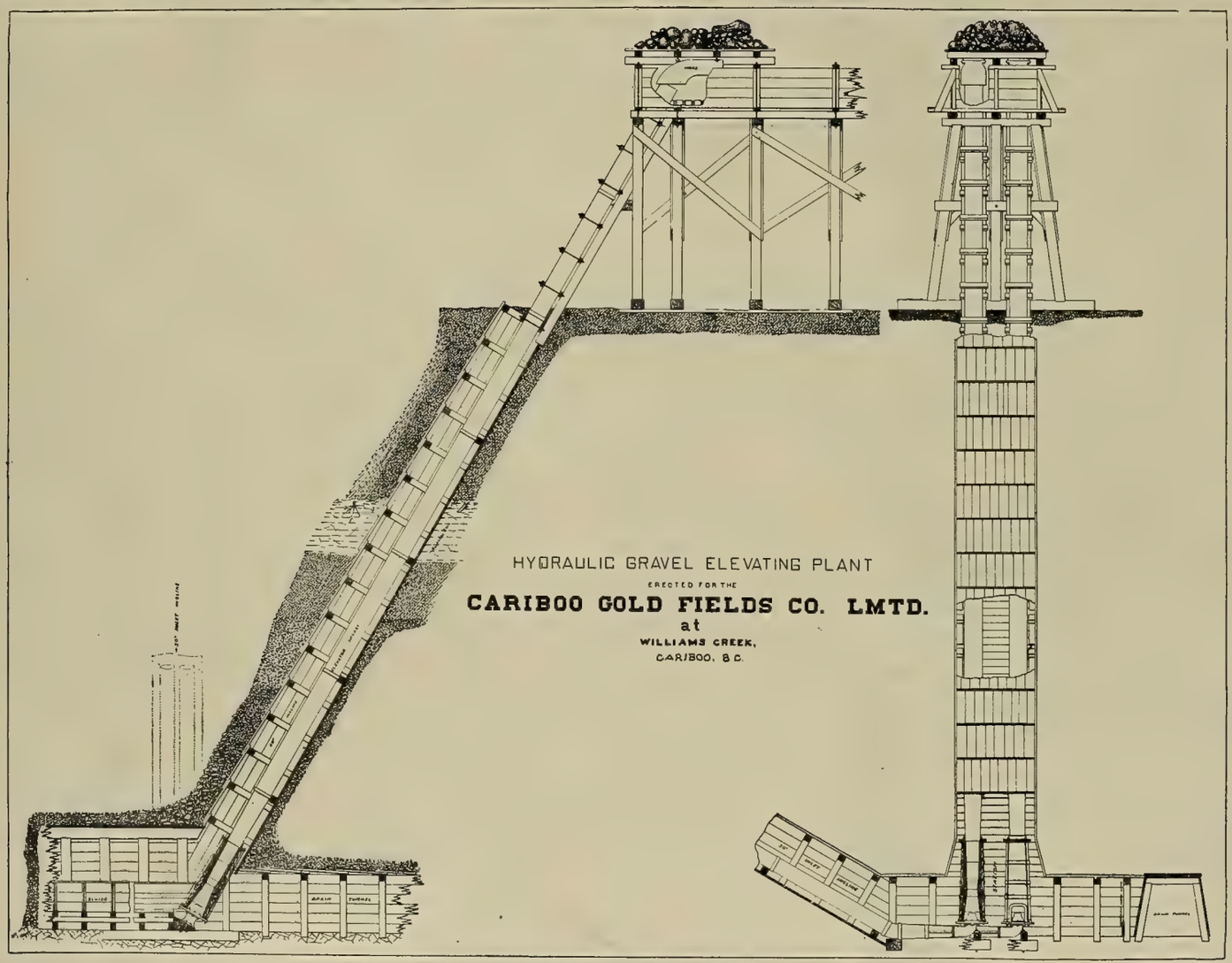
The supplies for Cariboo district are, at present, taken in by teams on wagons in summer and sleighs in winter, over a good road a distance of 300 miles from Ashcroft, a station 200 miles east of Vancouver on the Canadian Pacific Railroad.

Five hundred dollars to the pan sounds like exaggeration, and, as an old miner would say, "it's big ground," but many pans taken from the drifts in several of the claims on Williams creek, when they were paying their best, contained thirty to thirty-five ounces of gold, equal to $500 and over. The Cameron claim on Williams creek was one of the richest. The foreman of that mine during '63 and '64, who handled most of the clean-ups from that mine, is still living in Cariboo. He is considered a very conservative and reliable man. In talking over old times with the writer last summer, he related an instance that occurred one day at the Cameron mine, when they were working in some of the richest ground. Cameron, who was a jolly, good-natured fellow, had a couple of friends visit his claim one day, and after looking it over he said to the foreman, "Jim, take a couple of pans and go down and get each of my friends a pan of dirt." Jim did as he was directed and, wishing to do the thing in good shape, took a miner's candlestick and with the point selected from the face of the drifts two pans of the very best and richest dirt near the bedrock, and taking them to the surface washed them. One of the pans contained thirty ounces and the other thirty-one ounces, over $500 each. At that time other claims on the creek were yielding very largely, and there was considerable excitement throughout all the camps. The packers carried the news down the trails and it soon became heralded throughout the country that $500 to the pan was being taken out on Williams creek. In the Cameron claim the gravel paid from 50 to 100 ounces to the set of timbers, and as high as 150 ounces to the set of timbers was occasionally taken out. Other claims above for a distance of a mile paid nearly as well, and in one of these claims a shaft was sunk from which 140 pounds of gold were taken from the bottom alone. All of the richest portion of this creek was drifted out from one to three sets deep, *i. e.* from 6 to 18 feet nearest the bedrock, and the entire creek for over two miles rests on timbers. Lower down the creek the ground became deeper and more difficult to drain, and when the claims above were drifted out and stopped their pumps the claims below became flooded and were compelled to suspend operations, since which time no drifting has been carried on.

All drifting work on this creek was abandoned in the latter part of the '60 period, since which time numerous small hydraulic claims in the gulches above have deposited some 15 or 20 feet of tailings upon the drifted portion of the creek, once so rich, and to-day there is nothing to denote or indicate that there ever had been any mining done beneath this sea of tailings.

Some five years ago this old drift ground and a considerable portion lower down on the creek was bodied up, and a company formed in London, called the Cariboo Gold Fields, Ltd., took hold with a view of sluicing the entire deposit through hydraulic gravel elevators. The first work to be done was to construct a drain tunnel; to do this required over three years' time and an expenditure of $100,000. In the meantime ditches were constructed for conveying the water to the mine for operating the elevators. Over 12,000 feet of welded wrought iron pipe, 18 to 24 inches in diameter and one-fourth of an inch in thickness, weighing over 600,000 pounds, was shipped direct from England and hauled by teams from Ashcroft, nearly 300 miles, to the mine, costing over $80,000. The company now have two Campbell latest improved hydraulic gravel elevators in position at the mine, with pipe lines all connected with sluices and everything in readiness for water in the spring. The accompanying engraving shows the plant as erected.

The two main pipes that supply the elevators are each 4000 feet long, joints all being leaded; the pressure is 600 feet, which will give an effective head of about 240 pounds to the square inch at the nozzles.



The gravel will be elevated 88 feet, vertical height, and discharged into sluices 4 feet in width, paved with 8-inch blocks and having 3% grade.

Twenty-five hundred inches of water will be required to operate the plant; its capacity will be about 5000 cubic yards of gravel every twenty-four hours. To place the elevator in position inclines were sunk over the head of the drain tunnel to bedrock; here stations were made for the elevators, which were placed in proper position, the connections were all made, and the plant is ready for water in the spring.

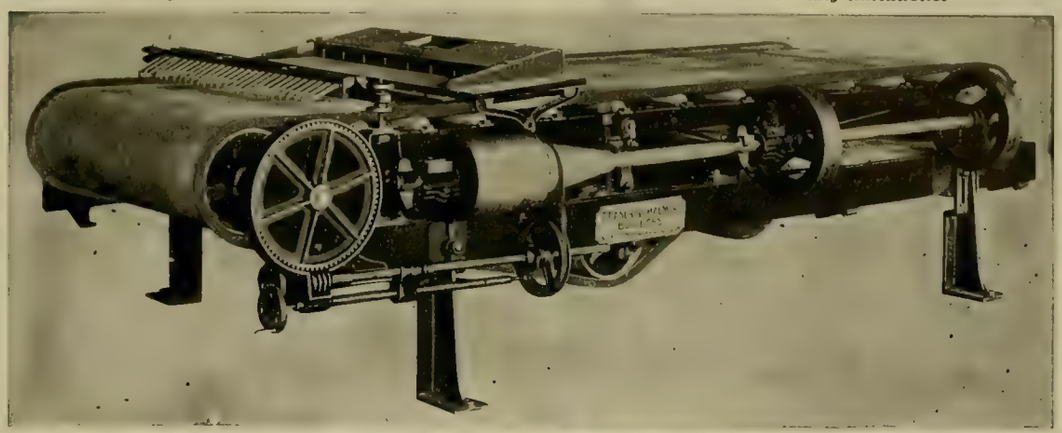
The gravel taken from the station where elevators sit was taken to the surface, washed and yielded $8 to the cubic yard. It is estimated that twenty to twenty-five millions of dollars in gold were taken out of Williams creek alone in the '60 period, and the richness of the gravel found lower down on the creek, where the elevators were placed, indicates that there are several millions yet remaining in old Williams creek, which it is expected will all be secured by the elevator process of working. This elevator plant is believed to be the largest and heaviest ever made.

The Parke & Lacy Co. of 21 Fremont street, San Francisco, are the agents for the Campbell elevators on this coast and Australia. R. H. CAMPBELL.

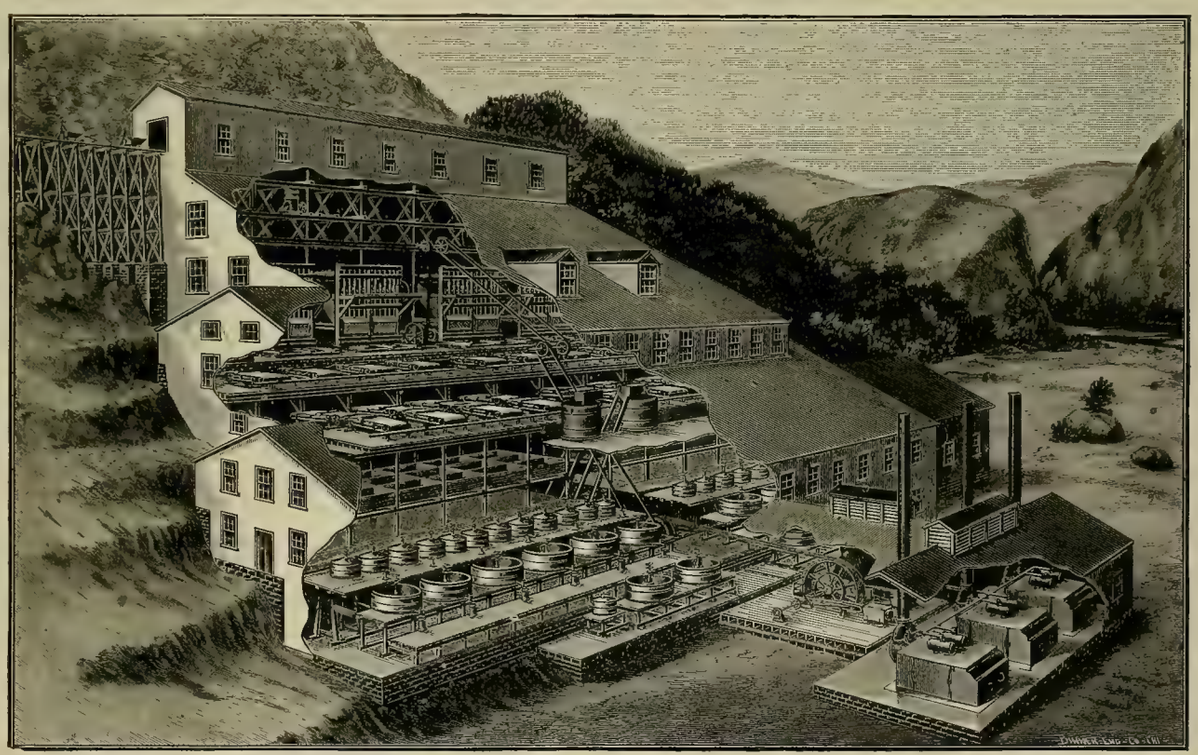
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The Eureka Hill Co's mill is at Eureka, Utah. This Company knows the value of close concentration and gave the above order after exhaustive competitive tests. (For description of the Eureka Hill Mill, built by Fraser & Chalmers, Chicago, see Fraser & Chalmers' Catalogue No. 29, fourth edition; also see cut below from photograph of mill, as built by Fraser & Chalmers, although used by others in their advertisements.



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There are thousands more, but the above list may be enough to convince mine managers that their interests will be best served by avoiding experiments with imitations and inferior designs, and buying the GENUINE FRUE VANNER of

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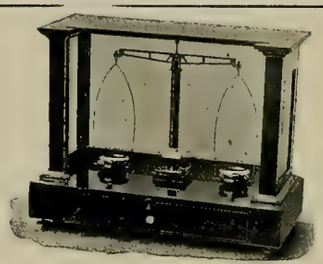
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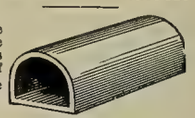
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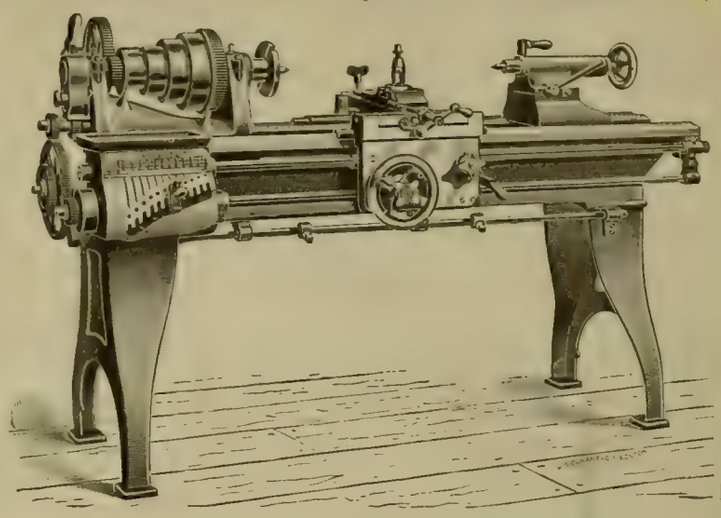
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Under the authority of the twenty-fourth section of the act of March 3, 1891, the President of the United States has created several large forest reservations for the purpose of protecting the forests and preserving the sources of water supply. Much valuable mineral land is included within these reservations, and the effect thereof upon the miners of the State is a matter to which I now wish to direct their attention.

It has always been the policy of the United States to reserve from sale or disposal any of the public lands which were needed for Indian, military or other purposes, and while thus reserved the lands were not subject to filing, entry or occupation under any of the laws provided for the disposal of agricultural or mineral lands.

The forest reservation policy is of comparatively recent origin, the first effort in that direction being an act of Congress of September 25, 1890, reserving seven townships in Tulare county, followed by the act of October 1, 1890, creating what is known as the Yosemite National Park, embracing about forty townships in Tuolumne and Mariposa counties.

On the 3rd of March, 1891, Congress passed an act authorizing the President of the United States to create any further reservations when deemed necessary, and under this act President Harrison reserved immense bodies of land on the slopes of the Sierra Nevada, San Gabriel and San Bernardino ranges of mountains. Just before President Cleveland retired from office he made reserves including the western slope of the San Jacinto mountain in Riverside county, and extended the reservation still farther north of the Sierra Nevada range.

These reservations in terms included all of the land within their exterior limits, excepting only those to which title had passed, which would have the effect of preventing any further prospecting or development of the mineral resources not already worked therein. This condition very justly alarmed the miners, and many protests were sent to Washington against these reservations. Special complaint was made against the Yosemite National Park from the fact that there was included in its limits much valuable mining property, and no method provided for the free ingress or egress over the public lands.

I am happy to say that the agitation against and the objections to the forest-reservation policy have been productive of good results. On the 4th of June, 1897, Congress passed an Act in which the following provisions are found:

1. It was declared that as to the reservations already created and those that might hereafter be set aside, it was not the purpose or intent to authorize the inclusion therein of lands more valuable for the mineral therein or for agricultural purposes than for forest purposes.

2. That the Secretary of the Interior should be authorized to sell timber therein for a value fixed by appraisement.

3. That the Secretary of the Interior might permit, under regulations to be prescribed by him, the use of timber and stone found upon such reservations, free of charge, by bona fide settlers, miners, residents and prospectors for minerals, for firewood, fencing, buildings, mining, prospecting and other domestic purposes, as may be needed by such persons for such purposes.

4. That nothing in the Act should be construed as prohibiting actual settlers residing within the boundaries of such reservations crossing the same to or from their property or homes, and such wagon roads or other improvements may be constructed thereon as may be necessary to reach their homes and to utilize their property, under such rules and regulations as may be prescribed by the Secretary of the Interior.

5. That any person may enter the forest reservations for all lawful and proper purposes, including that of prospecting, locating and developing the mineral resources thereon.

6. That settlers therein might maintain schools and churches.

7. That all waters of such reservations might be used for domestic, mining, milling or irrigating purposes.

8. That upon recommendation of the Secretary of the Interior, any of the public lands included within the limits of any forest reservation, which, after due examination by personal inspection of a competent person appointed for that purpose by the Secretary of the Interior, shall be found to be better adapted for mining or agricultural purposes than for forest uses, may be restored to the public domain, and any mineral lands in any forest reservation which have been or which may be shown to be such, and subject to entry under the existing mining laws of the United States and the rules and regulations applying thereto, shall continue to be subject to such location and entry.

This legislation has been brought about principally by the demands of the mining men within the original reservations, and thus every objection that can be urged against these reservations by the miners is obviated. Not only are they made unobjectionable, but the reservations are a decided advantage to the miner, because the lands not mineral are reserved from disposal, and the result is that such lands will be free and open to the prospector for many years to come and as long as the reservations exist.

Let the miners of the State therefore encourage the forest reservation policy, which is regarded as one of great importance to the prosperity of the State.

The most useful purpose served thereby is to prevent the destruction of the undergrowth by the ravages of sheep and fires. This is a real and not an imaginary danger. Extensive forest fires have yearly spread over these mountain ranges, destroying an immense quantity of timber and undergrowth, and the snows which should melt gradually and give a steady supply of water during the summer months are melted with the first warm days of spring, causing great floods and subsequent drouth and the possible prevention of placer and other mining.

The pasturage of sheep in the mountain forests must soon so change the flow of streams heading in these mountains that they will become worthless for irrigation. The sheep are kept in the valleys during the winter months, and are driven into the mountains during the summer. They carry desolation with them: shrubs, small trees and the grasses are eaten to the ground. The sheep men are in the habit of setting fire to the undergrowth, and these fires once under way continue until extinguished by rain, or until they encounter some natural barrier.

By excluding sheep from these reserved mountain ranges, fires will be prevented, the undergrowth will again appear, and the snows will be melted gradually, insuring a continuous flow of water to the farmers of the valleys as well as to the miners.

The California miners are interested in the prosperity of the agriculturists, but these nomadic sheep men are entitled to no sympathy. Let them be confined to the lands they own, and prohibit them from devastating the public lands to the injury of the agriculturists, miners and other productive industries.

A. H. RICKETTS.

Hydraulic Mining.*

NUMBER VI.

Lighting the Washing Pits at Night.—As hydraulic mining is, during the winter season, carried on without interruption, it becomes necessary to illuminate the pits at night. For this purpose great fires of pitch-pine wood were formerly in use, as they are still by all but the larger companies, which have introduced the electric light. When in use this style of light has been found economical, it affording a much stronger as well as a more reliable light than the pine wood.

The Gold-Saving Implements and Appliances.—The gravel brought down by piping finds its way directly into the sluice, small ditches, when necessary, being cut in the bedrock for conducting the admixture of water, sand, gravel and cobbles into the sluice, the boulders and larger cobbles being retained and piled up in the washing pit. The sluice is a race or flume constructed of planks or cut in the bedrock, usually the former, and constitutes, with its appendages, the principal gold-saving agency in hydraulic mining. Formerly the sluice, instead of a continuous race, consisted of a series of small wooden troughs open at both ends, the open end of one fitting into the upper end of another. These troughs, each 12 feet in length, were termed "boxes," and a series of these so joined together was called a string of sluices. When there is so little dirt to be washed that it can be thrown in with a shovel, instead of being piped down and swept in with a strong current of water, as in hydraulic mining, the old style of sluice is used. Ground sluicing consists in breaking down the auriferous earth with a pick or crowbar into a running stream, or by water brought in for the purpose, it is washed, and that generally without the aid of a sluice or any mechanical device.

The size of the sluice depends upon grade, quantity of water, and character of material to be washed; length, within certain limits, on the natural facilities there may be for extending it, and the nature of the gravel, some flumes having a total length of a mile or more. Where the purpose of the sluice is the conveyance of the tailings a long distance below the mine rather than saving the gold, it may have a length of several miles, such prolongation of the main structure being called a tail sluice.

As a general rule, the length of a flume should be sufficient to insure a thorough disintegration of the gravel passing through it, and allow the finer particles of gold to settle in the riffles or be caught by the quicksilver.

A sluice 6 feet wide and 3 feet deep set on a 4 to 6-foot grade will suffice for running 2000 to 3500 miners' inches. One 4 feet wide and 30 inches deep, on a 4 per cent grade, is large enough for 2000 inches, while one 3 feet wide and 2½ feet deep will do for 600 to 1000 inches, the grades and sizes here mentioned denoting those commonly employed.

The following are the rules to be observed in building the sluice as regards mode of construction, size of box, timber, etc.: For sluices 4 feet wide and upward, 1½ to 2-inch plank; sills and posts, 4x5-inch scantling. To guard against the leakage, the bottom planks should be of half-seasoned lumber, grooved, and a dry pine tongue inserted; bottom and sides spiked together with nails 4 inches apart; sills, from 3 to 4 feet apart, according to size of scantling used, which is regulated by the width of the sluice. Thus, a 4-foot sluice would require a sill 7 feet long of 4x5-inch stuff. The posts are halved into the sills and spiked, every second or third post being supported by an angle brace; bottom planks solidly spiked to sills.

To prevent the bottom of a new sluice from being raised by water collecting under it, the flume should be heavily weighted down by loading the projecting ends of the sills with stones. In tunnels, the ends of the sills can be held down by braces extending to the rock above.

The sluice is paved throughout its entire length with wooden blocks and cobbles, the latter selected of a shape and size suitable for the purpose, wooden blocks being always put in at the head of the sluice. The best wood for these blocks is the nut pine of the scrubby species, the fiber of which, being tough and long-grained, "brooms up," that is, wears rough, not smooth, like oak and other hard, fine-grained wood. These blocks, which are square, 8 to 13 inches long, are set on end in rows across the sluice, each row being separated by a space of 1 to 1½ inches. They are held in place by riffle strips 1½ inches thick by 2 or 3 inches wide. These strips are held crosswise on the bottom between the rows of blocks by the side lining and secured to the blocks by means of headless nails. The lining consists of a heavy plank nailed inside the sluice. Block riffles are sometimes kept in position by driving soft pine wedges between them and the sides of the sluice. Where both rocks and wooden blocks are used as riffles, they are set in the sluice in alternate sections. While the cobble riffle is cheaper than the wooden and saves the gold about as well, it requires more time for cleaning up, also a steeper grade, and, therefore, more water. After each cleanup or run, the blocks are turned end for end and replaced in the sluice, their use being continued until they are worn to a length of 4 or 5 inches, when they are no longer deemed serviceable. In placing the blocks in the sluice the alternate rows are fitted so as to break joints.

In some instances scantling placed lengthwise in the sluice have been used for riffles, also worn-out "T" rails, the latter being sought after when obtainable on account of their lasting qualities. When built on a curve, the outer side of a sluice requires to be slightly raised, as in the case of the flume already remarked upon.

The Grizzly.—The first favorable place along the line of the sluice presenting for the location of one of these contrivances is availed of, such place, because of the peculiar conditions required, being not very common. The grizzly consists of a grate of parallel iron bars placed over the sluice-box, its design being to catch and throw aside such cobbles as come down the sluice that are too large to pass through the interstices between the bars. It is this act of flinging off these rocks after the violent manner in which the grizzly bear is supposed to perform a similar act that gave this device its name. To enable this grizzly of the hydraulic miner to well perform its work, there must be a steep declivity close at hand over which the rocks rolling from it can be precipitated out of the way. Beneath the grating is placed a box for receiving the finer material that drops through it, and which is conveyed to a side sluice and by it carried down and returned to the main sluice.

The Drop.—Whenever, along the line of a sluice or the outletting channel below, there comes a considerable descent, this is availed of to give the gravel a precipitate fall—in the technique of the miner, "a drop," the object aimed at here being the breaking up and disintegration of the cemented gravel. The higher and more abrupt the drop the better. In some instances the outflowing material is, by a succession of falls, precipitated to an aggregate depth of 1000 feet or more, sluices and undercurrents being set between these falls where this is practicable.

* Begun in issue of Dec. 18th, '97.

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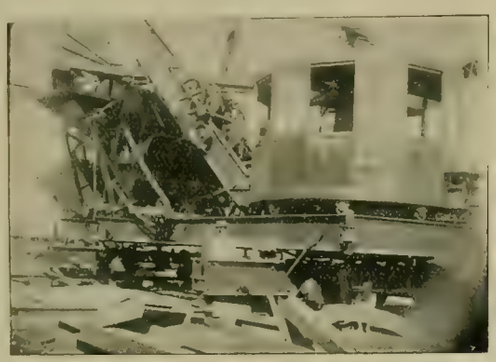
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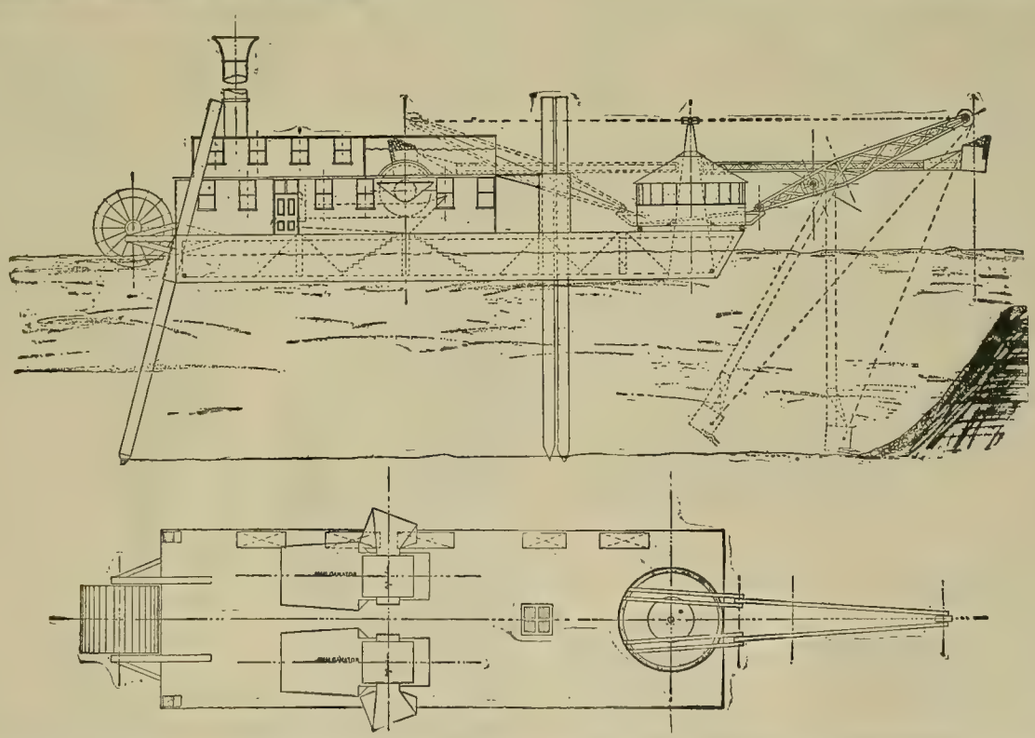
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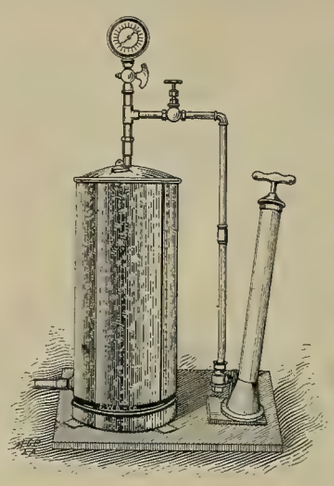
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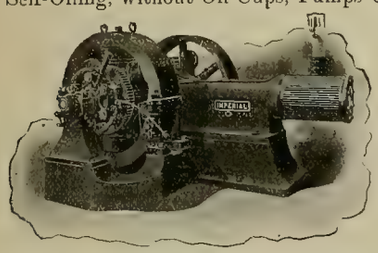
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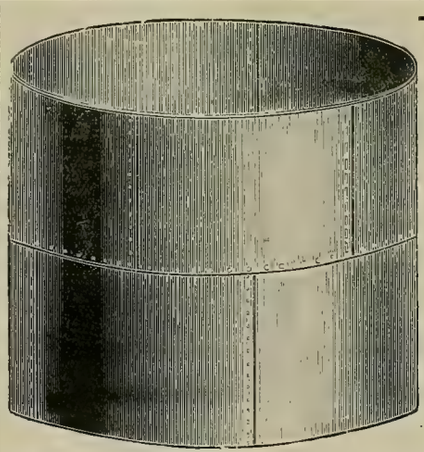
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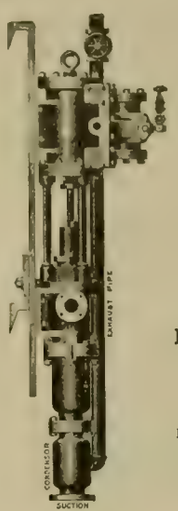
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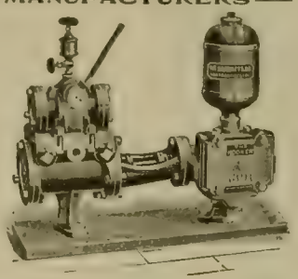
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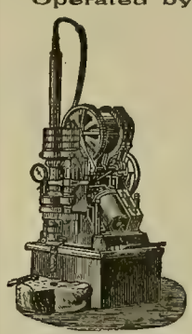




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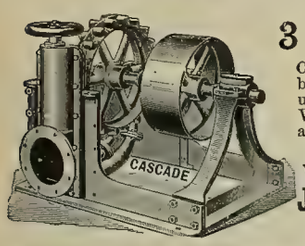
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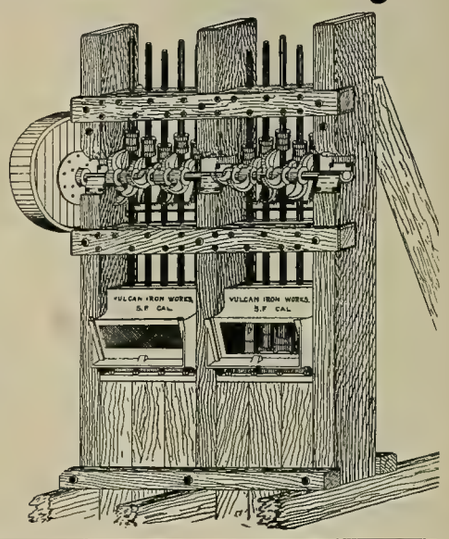
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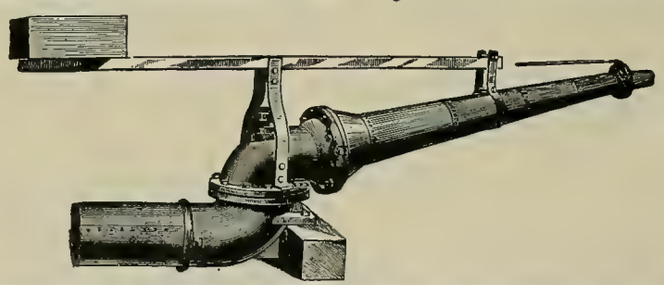
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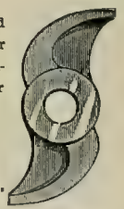

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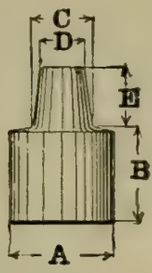
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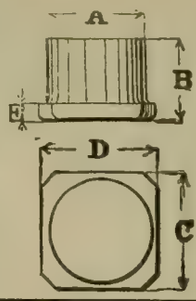
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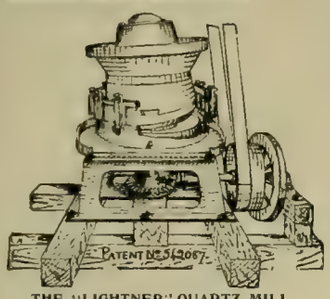
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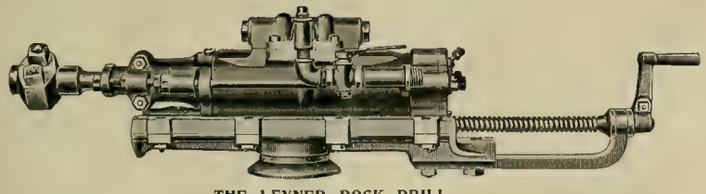
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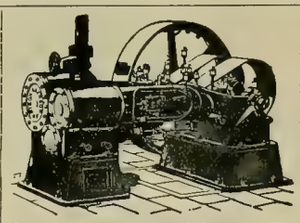
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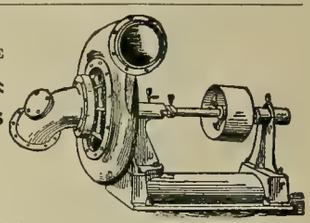
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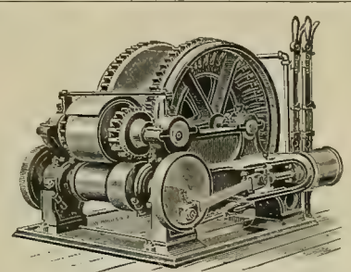
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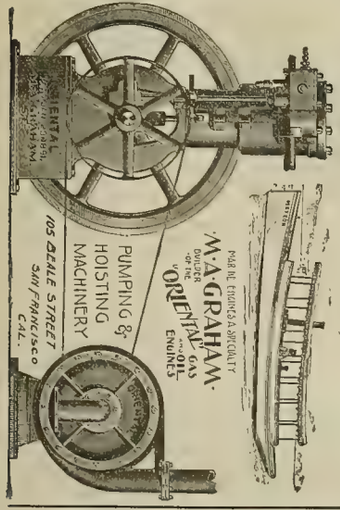
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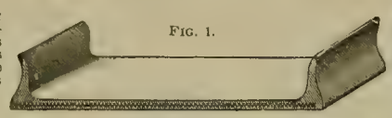


FIG. 1.



FIG. 2.

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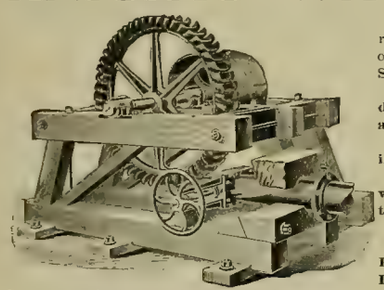
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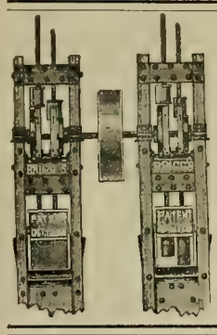
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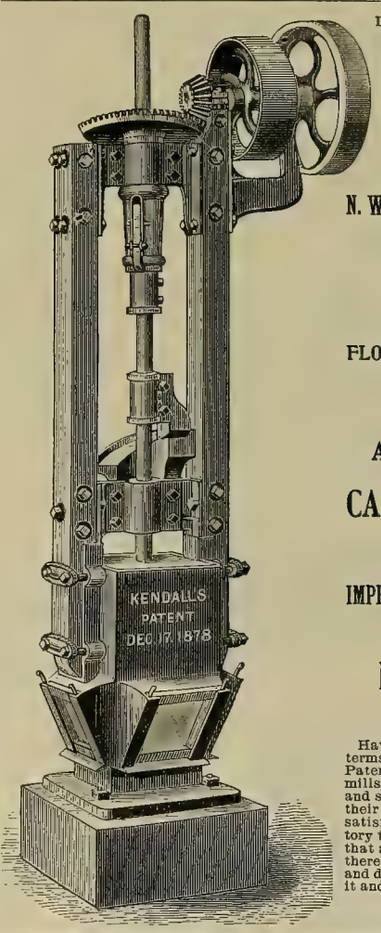
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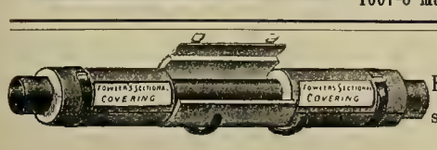
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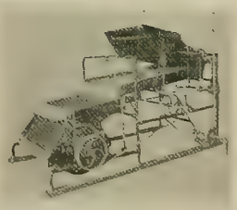


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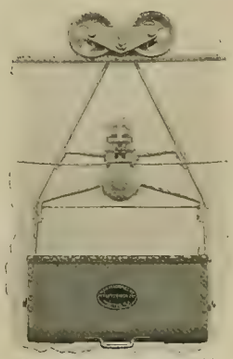
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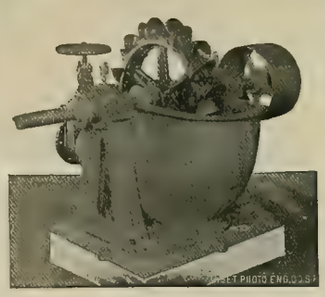
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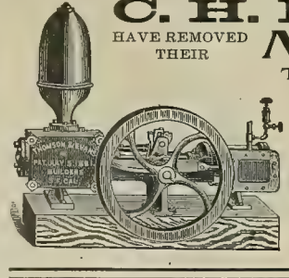
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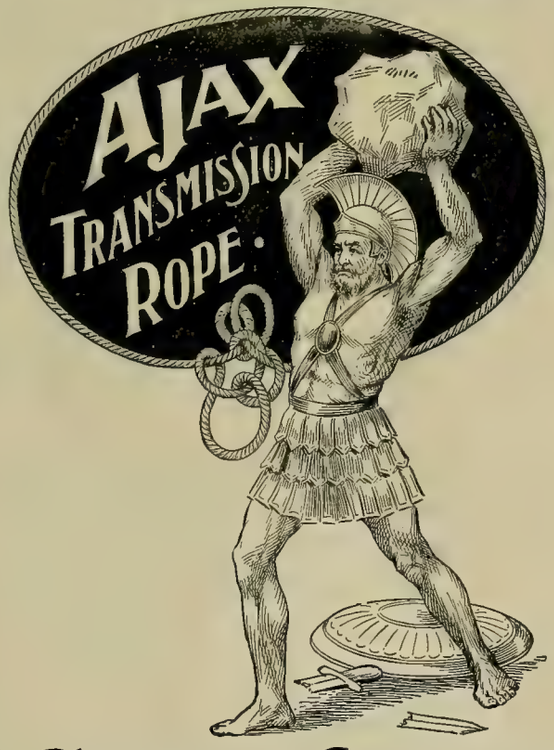
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This mill is constructed in a cylindrical shape, 15 feet in length and 33 inches in diameter, with steel bars running the entire length, and set ¼ inch apart, thereby forming a complete cylindrical screen surface of about *42 square feet*. Attached to the screen bars on the inside of the cylinder are *thirty-two* interchangeable gravity *hammers* placed in opposite position to each other, and running spirally through the entire length of the cylinder. The hammers are *operated* by the *revolving* of the *cylinder* and each independent of the other, and when in motion strike about *550* blows per *minute* of *fifty pounds each;* however, these hammers can be procured of various weights, and in proportion to the solidity of



Sectional View Showing One-Half of Interior and One Row of Hammers.

the material worked. The mill requires from 4 to 5 horse power to operate it. When running at full capacity will handle a maximum of *500 tons* per day. This depends to a certain extent upon the character of the material.

Placed on and near the top of the mill and running over the entire screen surface is a perforated 1¼-inch pipe, and one of the same size leading in at the upper side of the hopper, with a perforated cap with globe valve attached to regulate the continual spray of water that is used and assists in the process of disintegration, and at the same time carries the screened material away as it falls into the steel sluice underneath the cylinder. The cobbles pass through the entire length of the mill and discharge into a separate steel sluice, thereby avoiding all handling or assorting.

The mill when in operation *must* revolve from "*left to right*" when standing facing the *hopper*. The grade of the mill to be determined upon the character of material handled. All parts of this mill subject to the *greatest wear*, are built of *steel*, and is so constructed that it can be taken apart and transported to any locality. Weight of mill is about 7000 pounds. Price f. o. b. S. F. $750.

For further particulars, address

J. M. RADEMAKER, 110 First Street or 211 Kearny Street, San Francisco, Cal.

Market Reports.

The Markets.

SAN FRANCISCO, Jan. 27, 1898.

There is not a branch of trade but reports more business than at the corresponding time last year. The improved call comes from about every point on this coast, as also from Alaska. Very large sales have been made for Alaska, deliverable from February to May, particularly in hog products, which aggregate over one million pounds. It is roughly estimated that Alaska and British Columbia will take from this city, in all kinds of goods, several million dollars' worth this year. A large increase in mining machinery will go forward also. There is quite an exodus for Alaska from several mining districts in this State, particularly from those where there is a light supply of water, owing to dry and freezing weather, but their places will be taken by men coming here from other States.

In the local money market there is practically no change to report. Funds in bank are accumulating notwithstanding considerable money has been withdrawn by persons bound for Alaska and the Northwest Territory. Remittances going forward to the East in the absence of a liberal supply of bills on New York cause a strong market for exchange. The demand for accommodations is light while there is a good inquiry for commercial paper of undoubted standing. The East reports the same there. Selby Smelting & Lead Works say that the gold deposits with them in 1897 were the largest aggregate in the history of the company, but so far this year it is not up to the corresponding time last year although they expect that the total for 1898 will exceed that of 1897. The falling off this year comes chiefly from districts where the water supply has been reduced by dry weather and also by freezing weather. The receipts from the Klondike are in straggling lots as persons coming out from there bring drafts. It is estimated by competent parties that the output of the mines up there before the winter of 1898-99 will run over $10,000,000. There are some who place it considerably higher, more like that of this State in 1849. This will have an appreciable influence on our money market. Besides this confirmed advices state there will be large sums invested in California mines and also that there will be quite a big increase in the outturn by the deep mining mines.

New York Silver Prices.

NEW YORK, Jan. 27. — Following are the closing prices for the week:

	Silver in London.	Silver in N Y
Friday	26⅜	56⅞
Saturday	26¼	56½
Monday	26¼	56¼
Tuesday	26⅛	56¼
Wednesday	26⅛	56¼
Thursday	26 3-16	56⅜

	Copper.	Lead.	Iron.	Tin.
Fri.	10 85 @11 00	3 65	10 00@12 25	13 85
Sat.	10 85 @11 00	3 65	10 00@12 25	13 85
Mon.	10 85 @11 00	3 62½	10 00@12 25	13 85
Tue.	10 85 @11 00	3 62½	10 00@12 25	13 85
Wed.	10 85 @11 00	3 62½	10 00@12 25	13 85
Thur.	10 90 @11 00	3 62½	10 00@12 25	13 85

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$1.82¾
London Merchants	$1.81½
London Sight Bankers	$1.85¼
Refined Silver, per oz. 1000 fine	56⅜
Mexican Dollars nominal	47@—

SILVER.—The market has ruled at low prices throughout the week, although at the close it seems to be firmer. It has been unfavorably affected by stringent money markets in India, where there has been quite an appreciable increase in the rates of discount. It is also unfavorably affected by the uncertainty regarding the course of events in China, which lessens the call from that quarter.

MEXICAN DOLLARS.—The market has held to fairly steady prices throughout the week, notwithstanding the light call and weak market for silver.

COPPER. — The markets at home and abroad have not changed in the least the past week. Reports are current that the engineers' strike in England will be soon of the past, which, if proven correct, will cause a better demand from there, although money stringency in India may exert an unfavorable influence. Holders do not press for a market, believing in a better demand later on.

Our market is quoted as follows:

Ingot casting, jobbing	— @13
Ingot " wholesale	— @12½
Sheet copper	— @16½
Bolt ¼ and 5-16, 20c; ⅜ and larger, 16½	

TIN.—The market has held fairly steady. There is a good demand for plate. The East reports that three new plate mills will be in operation this year, which will enlarge the output very materially.

The market is quoted in jobbing lots as follows:

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " light, "	4 00@—

QUICKSILVER.—There is nothing new to report in our market.

Our market is quoted at $39 for domestic consumption and $35@36 for export to the west coast of Mexico.

LEAD.—The market is weak with a small concession obtainable on quotations.

Our market is quoted in jobbing lots as follows per 100 pounds:

Pig	4 75	@	5 00
Sheet		@	6 50
Pipe	5 30	@	5 80

IRON.—The market is surcharged, both here and in the East. The output of pig at the East is placed at 14,000,000 tons this year.

SHOT.—The market is easy at quotations.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, "	1 60
Buck, Balls and Chilled, do, "	1 60

COAL.—Seattle, Beaver Hill and British Columbia are higher. Light supply of available ships for bringing it here, and large number of the miners going to the Klondike.

Receipts of coal for the week ending Tuesday were as follows in tons: Departure Bay 4900, Coos Bay 450, Nanaimo 4233, Puget Sound 17,299, Swansea 1796, Australia 2146, Cardiff 1847; total, 32,671.

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	7 00@— —
Gilman	6 00@— —
Seattle	6 00@— —
Coos Bay	—@ 5 00
Cannel	9 50@— —
Egg, hard	12 00@— —
Wallsend	6 75@— —

TO ARRIVE—CARGO LOTS.

Australian	5 75
Liverpool Steam	6 75
Scotch Splint	7 50
Cardiff	7 50
Lehigh Lump	12 00
Cumberland, bulk	10 50
Egg, hard	9 50
West Hartley	6 75

COKE.—There is a good demand reported at current quotations.

The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	— —	@	— —
" spot, in bulk	11 00	@	— —
" in sacks	12 00	@	— —
Cumberland	10 00	@	— —

PLATINUM.—The market is steady.

Our market is quoted in a jobbing way at $15 per ounce and for scrap $10 an ounce.

BORAX.—The market is firm with a good demand ruling.

The market is quoted as follows:

Refined, in carload lots, in barrels	7
Refined, in carload lots in sacks	6¾
Powdered, in car lots	7
Concentrated, "	6½

ZINC.—The market is firm.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 45 to 50 cents per pound for ingots.

ANTIMONY.—The market is steady.

POWDER.—The market is firm at current quotations.

The market is quoted as follows for Hercules: No. 1, from 11¼c to 17¼c, according to strength and quantity; No. 2, from 9 to 11c, according to strength and quantity.

Chemicals.

The market begins to show more demand, but as yet the call is for small jobbing lots. New York advices report as follows: "Business of quite good volume is being effected, but there is nothing doing outside of the ordinary line, and prices remain without important variation. The only really interesting feature, in fact, was a report that 40c is being accepted for salicylic acid in some quarters."

CYANIDE OF POTASSIUM.—The market is steady.

Our market is quoted for chemical pure 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The demand is quiet.

We quote in a jobbing way at 1⅛c per lb for 66%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported firm from store at 6¼@7c per pound in carboys.

BONEASH.—There is a fair demand.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3¼c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady.

We quote in a jobbing way at 4c per pound.

SPELTER.—The market is steady.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is firmer.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steadier at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2¼c a pound from stores.

NITRATE OF SODA. — The market is steady.

Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

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DIVIDEND NOTICE.

JAMISON MINING COMPANY, Rooms 50 and 54, 120 Sutter St., San Francisco, Cal., January 25th, 1898.

DIVIDEND NUMBER ONE.—At their meeting of January 25th, 1898, it was resolved by the Board of Directors of the Jamison Mining Company to pay to the Stockholders of the Company from the surplus funds in the treasury, a dividend of Nineteen Thousand Five Hundred Dollars ($19,500), being Five Cents (5 cts.) per share on the capital stock of the Company. The dividend will be payable at the office of the Company on the Fifteenth (15th) day of February, 1898, to all stockholders of record on the Fifth (5th) day of February, 1898. Transfer books will be closed at the close of business on the 5th of February, and reopened on the morning of February 16, 1898. SAM. W. CHEYNEY, Secretary.

The GOLD DEPOSITS of CALIFORNIA and the KLONDIKE.

The February number of the Engineering Journal of Stanford University will contain five articles on interesting mining subjects. Mr. Wm. Lindgren, of the U. S. Geologic Survey, writes an article on the Gold Deposits of California. Mr. Rufus Buck, a Graduate Mining Engineer of Stanford, writes from Dawson City on the Gold Deposits of the Klondike. Mr. Buck has been on the ground for some time, and if you wish a true statement regarding these Gold Fields you should not fail to read what he has to say. For a copy, send your address and 25c to the Engineering Journal, Stanford University.

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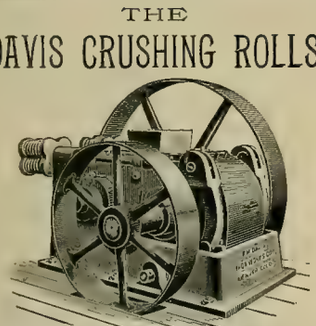
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Assessment Notices.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 3rd day of January, 1898, an assessment (No. 12) of 3 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

THE SAVAGE MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 6th day of January, 1898, an assessment (No. 94) of 20 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

FALL RIVER CONSOLIDATED GOLD QUARTZ Company.—Location of principal place of business, San Francisco, California; location of works, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 15th day of January, 1898, an assessment (No. 11) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 313-315 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on THURSDAY, the 21st day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. LORSBACH, Secretary.

Office—313-315 Front street, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

BALIOL GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1898, an assessment (No. 2) of 30 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of March, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Mills building, room 7, fifth floor, San Francisco, California.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Humboldt County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 29th day of November, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Harvey M Blackley	2	1	5 00
Alice E. Binckley	20	4	20 00
Alice E. Binckley	23	20	100 00
Alice E. Binckley	24	20	100 00
Alice E. Binckley	25	20	100 00
Alice E. Binckley	26	20	100 00
Alice E Binckley	39	1	5 00
Alice E. Binckley	40	2	10 00
Caroline S. Townsend	18	20	100 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the corporation, 125 Beale street, San Francisco, California, on SATURDAY, the 29th day of January, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from O. M. Henry, in the Murphy Diggings, near Volcano, Amador Co., to deposit tailings in Rancheria Creek; from Geo. A. Gritton, in the Clap Board Gulch Mine, near Volcano, Amador Co., to deposit tailings in Sutter Creek; from Frank J. Goyan, in the Cox Mine, near Placerville, El Dorado Co., to deposit tailings in a ravine; from J. M. Longnecker, in the Hull Placer Mine, near Genesee, Plumas Co., to deposit tailings in a ravine; and from E. Becker and Robert Mooney, in the Homestake Mine, near Amador City, Amador Co., to deposit tailings in Rancheria Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on February 7, 1898, at 1.30 P. M.

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Are unique and handsome in appearance, and produce harmoniously three distinct tones which blend and form a beautiful musical chord. The sound given forth from our style of Chime Whistles, while being more acute and piercing than the common whistle, have not the harsh and disagreeable qualities of the latter and can be heard at a greater distance. The entire bell and dome are cast in one piece, which makes them stronger, more rigid and neater in design than any other whistle on the market.

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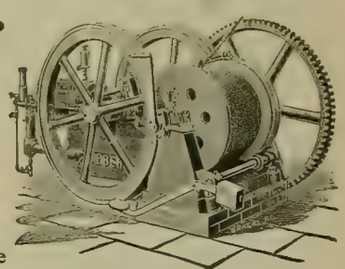
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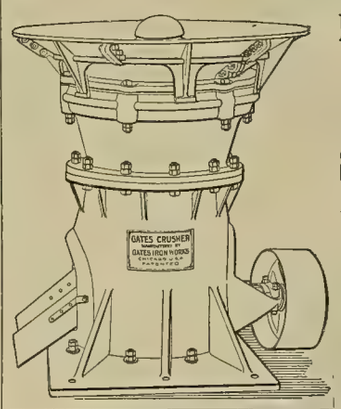
CHAPAREL, ARIZ., June 7, 1897.

WEBER GAS & GASOLINE ENGINE CO., KANSAS CITY, MO.—GENTLEMEN: The 10 H. P. "Weber" Geared Hoist you sent us has been in constant use since May 23rd, and is doing everything guaranteed by you with perfect satisfaction. Besides hoisting the ore and waste from the shaft with three 8-hour shifts sinking it is kept very busy hoisting water, and has never been cooled off since we put it up and started it going. We were then 53 feet deep and we are now 108 feet. It will consume about ten gallons every twenty-four hours of 65 deg. gasoline, but I think when we can procure the 74 deg. gasoline, the consumption of fuel will be less. The engine was put up started and has been run without our ever having seen a gasoline engine in operation before. Neither of the parties now running the hoist had ever had any experience with gasoline, and neither are professional mechanics. The engine hoists the loaded bucket with two men on top with apparent ease, starting loaded as easy as any engine can possibly do. I consider the hoist a complete success, and should I again have use for another engine, this would be my choice. Respectfully yours, GOPHER GOLD MINING COMPANY. Per H. B. Hanna.

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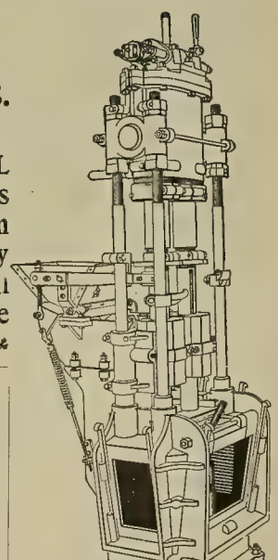
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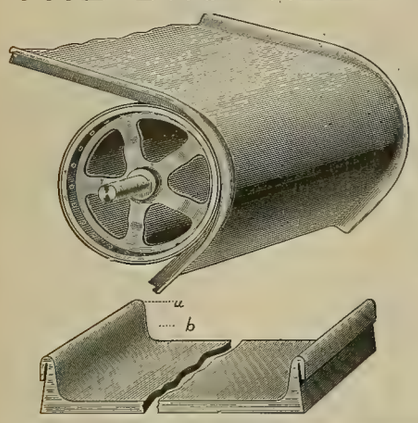
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RAWHIDE GOLD MINING COMPANY.
JAMESTOWN, TUOLUMNE CO., CAL., Feb. 21, 1897.

J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

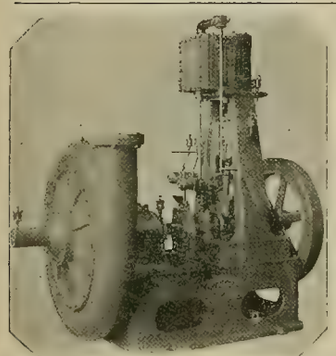
AMADOR CITY, CAL., Feb. 18, 1897.

MR. J. S. BROWNELL—DEAR SIR: I take pleasure in saying that I have used your Patent Lipped flange belt for several years while connected with this company, and I consider them the best that we have used. The quality of rubber in the flange seems to be the best, and we are not bothered with the flange cracking and thereby destroying the life of the belt. At present we are using 14 concentrators, and have in use several kinds of belts. We consider your Patent Lipped flange the best. Yours very truly, THE CONS. SOUTH SPRING HILL G. M. CO.
By JOHN R. TREGLOAN, Superintendent.

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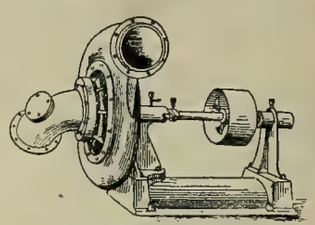
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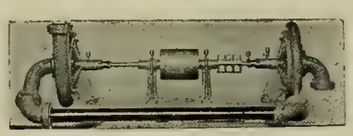
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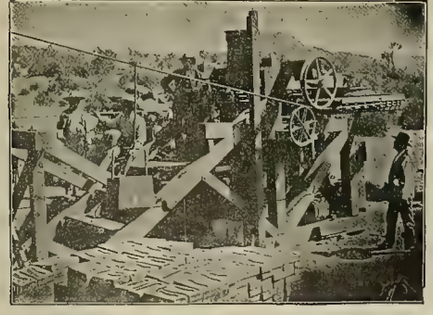
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FOR the convenience of our readers in the mining counties we print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco.

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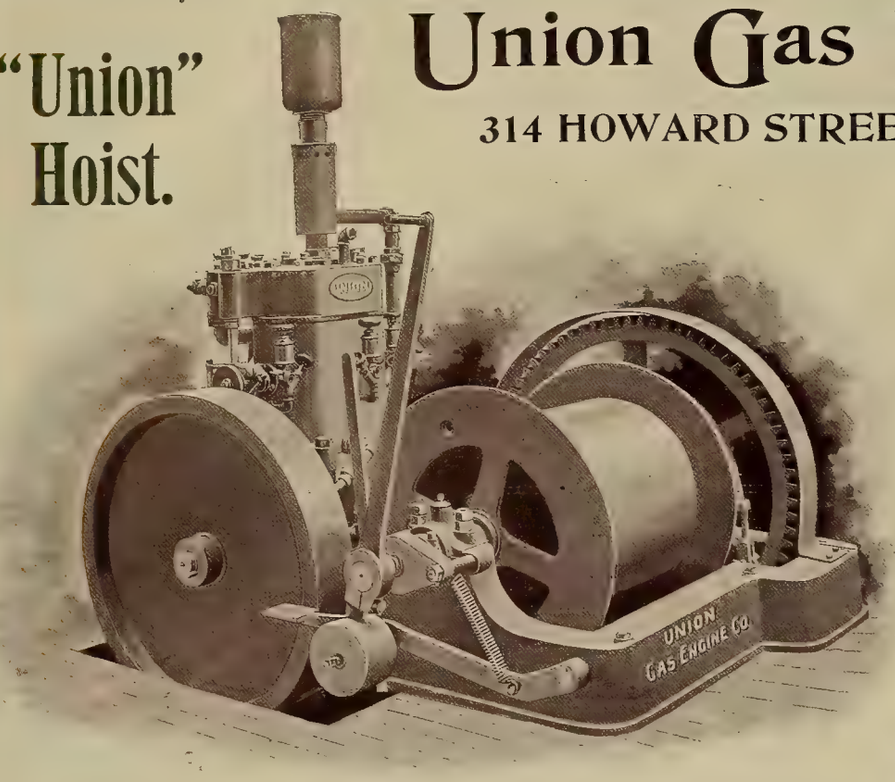
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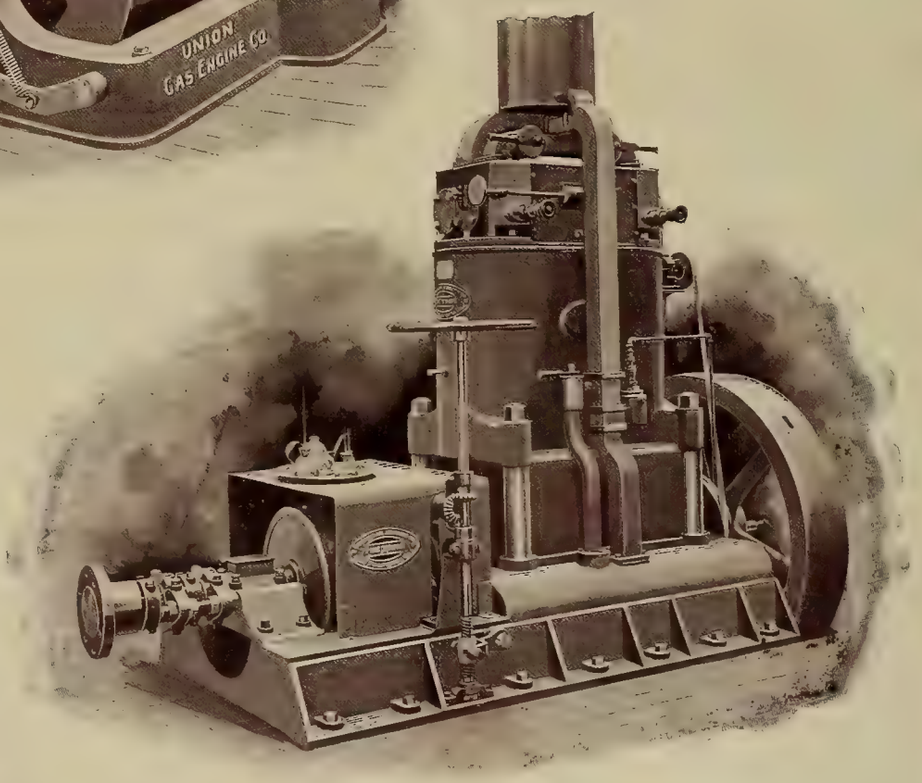
Union Gas Engine Co.,

314 HOWARD STREET, SAN FRANCISCO.

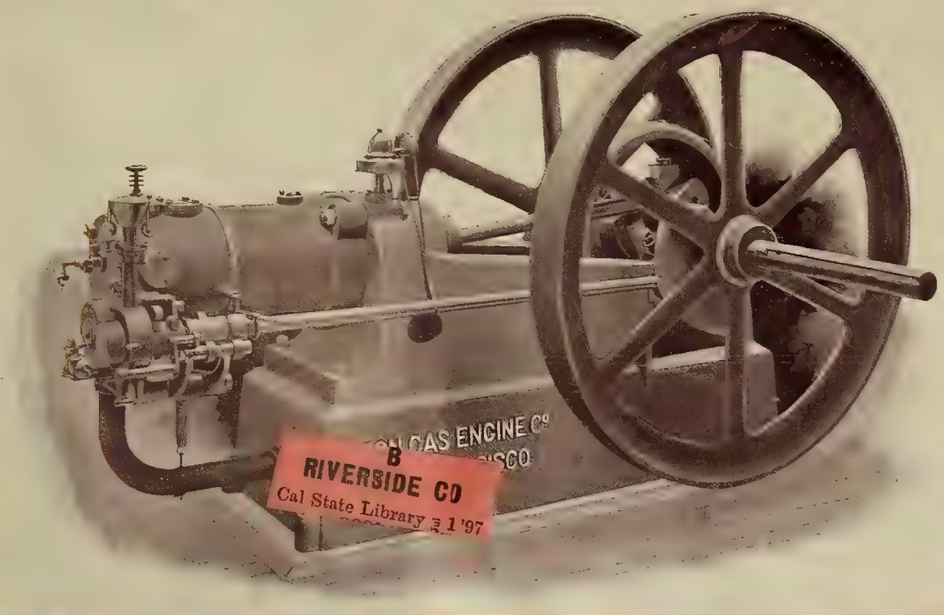


This 10 H. P. "UNION" HOIST lifts One Ton 125 Feet Per Minute. Works down to 600 feet. Costs about Fifty Cents for 24 hours' hoisting. Weighs 3,500 pounds.

"UNION" MARINE ENGINE 1897 TYPE.



The cut opposite illustrates the latest improved 50 H. P. "UNION" Duplex Marine Engine with dynamo, patented reversing gear, improved vaporizer, adjustable electrodes, governor, ball thrust bearings, combination exhaust muffler and heater, indepeudent throttles and self-starter. It has a heavy forged steel crank, with pistons set opposite to balance each other. Connecting rods of forged steel, with phosphor bronze bearing metal boxes. The lubrication of cylinder and connecting rods is all from one box, with sight feeds. The bright parts are nickeled. Floor space 48x104 inches, including flywheel and thrust bearing. Shipping weight about 11,000 lbs.



"Union" Gas Engines

Use either Manufactured or Natural Gas, Ordinary Stove Gasoline Naphtha or Benzine), Distillate or Kerosene.

This horizontal "UNION" Stationary Engine is our latest product, and is the result of twelve years' experience. It contains a number of new and important features. It is remarkably economical and very steady. It is particularly designed for running dynamos, centrifugal pumps, ventilating fans and machinery requiring steady, reliable and economical power.

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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1961.—VOLUME LXXVI. Number 6. SAN FRANCISCO, SATURDAY, FEBRUARY 5, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Motive Power in Dry Mining Districts.

In many parts of the west half of America, rich in mineral wealth but devoid of fuel and water, the question of motive power is an important one. The gas and gasoline engine, using naptha and crude oil where necessary, greatly aids in the solution of the problem. Herewith is illustrated a recent installation of four gasoline engines for Biddle Reeves, on the Fuller mines, in the Squaw mining district, near Canon, Yavapai Co., Arizona.

Fig. 1 represents a 38 H. P. engine in the mill proper, used to drive the 10-stamp battery and the electric light plant for the mill. The engine is fitted with wiper oilers and indestructible ignition tube, enabling it to make long continuous runs without interruption. Fig. 2 represents a 10 H. P. engine, used to operate a No. 3 Gates crusher, located 300 feet above the millsite at the mouth of the mine, the crushed ore being shot down a chute to the mill. Owing to the nature of the ore, four or five hours' crushing per day suffices for making a 24-hour run at the mill. Fig. 3 represents a 6 H. P. high-speed engine, used exclusively for operating the concentrators, special attention being paid to steady and uniform speed. No other service is required of this engine except the running of the concentrators. This engine is also arranged for long and continuous duty. Fig. 4 represents the isolated pumping station, consisting of a 10 H. P. gasoline engine directly connected to a 5x8 triplex pump. This plant is located 3100 feet from the millsite, where a supply of water is forced to an elevation of 150 feet through 3100 feet of pipe line. This plant has a pumping capacity of 80 gallons water per minute. This water is delivered into a storage tank a little above the mill, where about 10,000 gallons of water is stored, so that in the event of shortage or breakage the mill could continue without interruption until such repairs could be made. The four engines noted above, aggregating 54 H. P. used in the operation of this plant, consume about 100 gallons of gasoline per twenty-four hours, making the total cost of power for twenty-four hours about $17. This mill is located at a point where it would be impossible to use steam, owing to the fact that the water now developed is only sufficient for milling purposes; the saving, therefore, in this class of power is practically unlimited. While the plant described above is at present only operating ten stamps, the machinery is so arranged, together with a surplus of power, that another ten stamps can be added at any time. The plant described above was built and erected by the Weber Gas & Gasoline Engine Co., 430 S. W. Boulevard, Kansas City, Missouri.

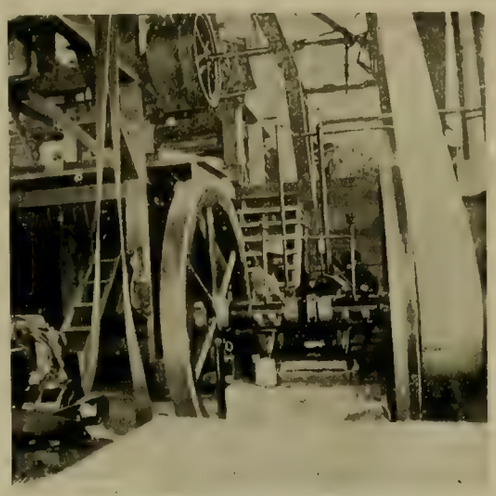


FIG. 1.—38 H. P. ENGINE IN MILL.



FIG. 2.—10 H. P. ENGINE OPERATING CRUSHER.



FIG. 3.—6 H. P. HIGH-SPEED ENGINE.



FIG. 4.—10 H. P. ENGINE AND PUMP.

THE seventy-fourth meeting of the American Institute of Mining Engineers will be held at Atlantic City, N. J., beginning Feb. 15th, '98. The following is a partial list of the papers thus far announced for this meeting: "Compressed Air Power Transmission at Kellogg, Idaho," by F. W. Bradley, Washington, Cal.; "Camp Floyd Gold Deposits, Mercur, Utah," by E. A. Wall, Salt Lake City, Utah; "A New Form of Ingot Mould for Casting Brass or Bronze Ingots, with Remarks on the General Form of Ingots," by Erwin S. Sperry, Bridgeport, Conn.; "Emery, Chrome, Ore and Other Minerals in the Villayet of Aidin, Asia Minor," by W. F. A. Thomae, London, England; "The Bildt Automatic Feed Device for Gas Producers," by C. W. Bildt, Worcester, Mass.; "Notes on the Caucasus," by Dr. Persifor Frazer, Philadelphia, Pa.; "Apparatus for Removing the Sand from the Waste Water of Ore Washers," by J. E. Johnson, Jr., Longdale, Va.; "The Influence of Antimony on the Cold Shortness of Brass," by Erwin S. Sperry, Bridgeport, Conn.; "The Ultimate and Rational Analysis of Clays and Their Relative Value," by Heinrich Ries, New York City; "Mining Districts of Colombia," by H. G. Granger and E. B. Treville, Quibdo, Colombia, S. A.; "A New Departure in Breaker Building at Cranberry Coal Mine, Hazleton, Pa.," by W. S. Ayres, Hazleton, Pa.; "A Study of the Elimination of Impurities in the Reverberatory and Convertor Processes of Copper Production from Copper Matte," by Edward Keller, Baltimore, Md.; "Note on Limonite Pseudomorphs from Dutch Guiana," by R. W. Raymond, New York City; "The Manganese Ore Industry of the Caucasus," by Frank Drake, New York City; "Mining Timber and the Forest Reserves," by Gifford Pinchot, Washington, D. C.; "Some Peculiar Occurrences of Gold Ore in Montana," by W. H. Weed, Washington, D. C.

A PETITION by a stockholder and bondholder of an insolvent company to inspect a mine, either in person or by agent, with a view to having the receiver in charge of such company removed, is in the nature of a motion for the production by parties of books or writings in their possession; and being made by a party in interest, and therefore entitled to the knowledge sought, will be granted by a United States court.

WITH pardonable pride, the New York *Evening Post* takes a page to advertise the fact that its issue of Dec. 11, '97, contained 30,813 lines of displayed advertising, which was very good. Last week's issue of the MINING AND SCIENTIFIC PRESS contained 85,456 lines of displayed advertising.

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J. F. HALLORAN.....General Manager

San Francisco, February 5, 1898.

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THERE is nothing in the recent widely published statement that gold dredging machines would not be allowed in the Yukon region.

THE administration is in favor of establishing an assay office somewhere on the Yukon this season. Seattle, Wash., had been making a fight for the institution to be located there, but without success.

THE little rain of the week is of no practical benefit to the California miner. For an average season's work considerable rain and snow are necessary, and so far this winter there has been practically none.

THE Spanish mine, Nevada county, Cal., is a good example of a cheaply worked property, though the exceptional conditions favor a lower cost than ordinary. At present twelve men furnish the mill with 270 tons of ore daily, which is mined and milled at a total cost of 65 cents per ton.

THE California State Mining Bureau, including the museum, is to be removed to the new union depot at the foot of Market street, San Francisco, from its present location in the Pioneer building, on Fourth street, where a monthly rental of $250 has been paid for many years. In its new location the State will charge the bureau $100 per month.

IT is neither the province nor the purpose of this paper to note or contradict the innumerable incorrect statements made regarding mining matters, but it is in order to say that the recent flaming statement that a national smelting trust had been organized, and that all the smelters would be under one management, etc., has no foundation in fact.

THE best procurable statistics give the yield of gold in California for the calendar year 1893 as aggregating $12,422,810; for '94, $13,923,282; '95, $15,334,422; '96, $17,343,280. For '97 the yield is variously estimated at from $18,000,000 to $18,500,000. It will be some weeks yet before the statistics by counties can be secured. The extreme cold and unusual drought of the last sixty days of the year curtailed the production of all classes of gold mines in this State.

RECENT statements in this paper regarding the date of the discovery of gold in this State by Marshall are the subject of some remarks by Mr. E. E. Chever on page 158 of this issue. Mr. Chever's statements are entitled to the most respectful consideration. The question has been fully discussed and has formed a matter of contention for some years. The case stands thus: Marshall himself on several occasions signed positive statements that the discovery was made on the 19th of January, 1848; and some months before his death, in an interview with the editor of this paper, reiterated the assertion. His companions with him at the time—four of whom have been in this city during the week—say that the 24th of January was the date the discovery was made. Thus there seems to be a hopeless division of opinion; but now that the Golden Jubilee and its attendant publicity stamped the 24th of January as the fiftieth anniversary of the great event, it is probable that that date will continue to be observed.

RIVER IMPROVEMENT is still in the circumlocution office. The opinion of the California attorney-general is being sought as to whether the State Board of Public Works must comply with the explicit provisions of the law making the State appropriation of $550,000, and the opinion of the Attorney-General of the United States is asked as to how vouchers should be drawn for the work as done. Meanwhile nothing is done but talk, the money lies idle, and mountain and valley residents regretfully view the prospect of the whole thing being a heritage to posterity.

LAST Tuesday a conference committee from all the commercial bodies of San Francisco met to consider the proper representation of California at the Omaha Exposition, resulting in the appointment of a committee to make preliminary arrangements. The movement is essential to the State. This is the age of advertising, and California has something to advertise. A showing of mineral products such as is now on exhibition at the Golden Jubilee Mining Fair would be of value to the commonwealth if seen by 3,000,000 people at Omaha next summer.

THE Klondike craze must run its course. Advice or argument is useless. Those who propose going will see it through. The energy, money and tenacity of purpose could better be expended at home, but the indirect result will be favorable to the coast. The whole thing is part of a liberal education, and those who come back, whether they have money or not, if they have enough health or vigor remaining after that cruel experience, will aid in the material development of this region. Transportation companies and furnishers of all kinds of supplies will make money this season.

RECENTLY a supervisor of Yuba county, Cal., presented a bill for time attending a meeting of the Anti-Debris Association. The bill was rejected; suit was brought, and in the Superior Court judgment was in favor of the county. On appeal the Supreme Court of the State sustained the decision, the unanimous opinion of the justices being virtually that the Anti-Debris Association had no legal existence, and the expenditure of any public county or State money in connection therewith was not legally within the power of any county or State official. This is a new phase of an old question. As a matter of fact as well as of law, the residents of any California county who believe in hydraulic mining have the same right to have public money appropriated to aid their views, as opponents of that system have, that is, no right at all, in law. As the thing has gone on for many years, sundry residents of the State pay taxes which are illegally applied to oppress, harass and destroy a part of the community supplying the money—the money that goes for salaries being the chief incentive to the continuance of the organization on the part of those to whom the salaries are paid.

THE President of the United States, on last Saturday evening, touched a button at the seat of national government, 3200 miles away, and set in motion the machinery of the Golden Jubilee Mining Fair at Mechanics' Pavilion in San Francisco. It is estimated that ten thousand people were present. The Fair will continue until March 5th. So much has been said about it in these columns that it is deemed but necessary to reiterate an invitation to all who can to visit it. Wherever the eye turns will be found much of interest. Some of California's famous gold-producing counties—among them Amador, Nevada, Calaveras, Tuolumne, Yuba and Butte—have fine exhibits of gold arranged in striking forms. Some of our leading mining machinery manufacturers have apparatus in full operation. The North Bloomfield hydraulic mine, the largest property of the kind in the world, has been faithfully reproduced. This alone is worth seeing. There are numerous mining devices in operation; the State Mining Bureau has a fine exhibit, and anyone contemplating a journey to the Yukon can save considerable money and catch on to a good many up-to-date ideas by a visit. February 22nd will be Miners' Day at the exposition, at which time there will be drilling contests, tool sharpening contests, Cornish wrestling, etc., for cash prizes.

AN opinion of some interest to miners and prospectors was last week rendered by Federal Judge Hanford at Seattle, Wash, in a suit brought against T. H. Mallory by M. A. Cisna and seven other citizens of Spokane for a share in the mining claims owned by Mallory in Klondike district. The principal point involved in the case was how long does a grub-stake contract last, no limitation being set in the terms of the agreement. In deciding the case Judge Hanford said: "I consider that the contract cannot be fairly construed so as to create any right in favor of plaintiffs to property situated in a distant foreign country, purchased by Mallory with his own money more than two years after the agreement was entered into. Grub-stake contracts will be enforced by the courts, but only as other contracts." The court concluded by holding that the showing made by the plaintiffs was insufficient, and the application for an injunction pende lite was denied, the plain English of the whole thing being that, in Judge Hanford's opinion, there must be a definite limit to a "grub-stake" agreement.

IT requires nimble wits to keep up with the consecutive rulings of the administration regarding mining requirements. Recently the Secretary of the Interior ruled that any one wishing to patent a group of claims could do all the development work on one claim, if it tended to develop the entire group, and was virtually only required to make an expenditure of $500 for work or labor or improvement on each group of claims, but the regulations of the general land office, approved Dec. 15th, '97, now require that no less than $500 worth of work or labor shall be expended on improvements made upon each claim before entitled to patent. Paragraph 53 of the general land office regulations reads as follows: "The claimant, either at the time of filing these papers with the register, or at any time during the sixty days' publication, is required to file a certificate of the surveyor-general that not less than $500 worth of labor has been expended or improvements made upon the claim, and if more than one claim is included in the application, that an amount equal to $500 for each claim has been expended by the applicant or his grantors; that the plat filed by the claimant is correct; that the field notes of the survey, as filed, furnish such accurate description of the claim as will, if incorporated into a patent, serve to fully identify the premises, and that such reference is made therein to natural objects or permanent monuments as will perpetuate and fix the locus thereof."

NOT the least among the pleasant memories of the recent great celebration of the 50th anniversary of the discovery of gold in this State are the kindly comments of the leading newspapers in California's sister States. Long and gracefully worded editorials congratulatory and commendatory appeared last week in many contemporaries. The Salt Lake, Utah, *Tribune* closes an exceedingly fine article by saying:

It is right for the children of the great State to celebrate; right for them to glorify their State and themselves for being children of the State; right for them to call over the names that made the early history glorious, and to look with hopeful eyes toward a future which seems to have no cloud upon its horizon, and only new bounties in its gifts.

In like manner, in the course of its editorial remarks, the Denver, Colorado, *Republican* says:

It is with good reason that the people of California are celebrating the 50th anniversary of the discovery of gold in that State. That discovery was the birth of a new community which soon attained to the dignity of statehood, and that since has grown to be one of the great and prosperous members of the American Union. California has not exhausted the wealth of its gold mines, but it has found in other industries sources of revenue as great as the sands of its rivers and the mineral veins of its hills. It has become a great, wealthy and populous State. Its name has become almost a synonym for riches, and the greatness and the glory of its future are assured.

Other leading journals elsewhere comment in the same eulogistic strain, and, apart from the truth of the statements, the kindly spirit that actuates those utterances is heartily appreciated.

The Deep Levels of the Comstock Lode.

The following editorial paragraph appeared in last week's issue:

The greatest depth ever attained on the Comstock, Nevada, lode was in the Union Con., in the north end—3350 feet—just fifteen years ago, when the clamor for dividends caused the mines to be allowed to fill with water. Many miners argue with considerable show of reason that to unwater and push deeper would unearth a third bonanza.

The above paragraph briefly expresses the present status. Unusual interest attaches to this matter, the advisability of such action being warmly advocated. In view of the importance of the subject is herewith reproduced a statement of facts in connection with this whole matter:

The impression prevails even on this coast that the Comstock lode has been explored to the greatest depth possible; that with the exception of a few scattering streaks and bunches of ore in old levels above the Sutro tunnel the mines are exhausted. Some say that at the depth of 3000 feet, or a little below, the lode pinched out; others, that at the depth of about 3000 feet only barren quartz was found. But the notion most generally prevalent is that at the bottom of the deep shafts such rivers of water were tapped that the mines were all flooded and the miners drowned out, no pumps being capable of handling water that poured in from the subterranean depths. The conclusion arrived at by the majority of outsiders is that in depth the Comstock is dead and that work can never again be done on the great lode below the points where sinking was suspended in the Jacket, Union, Combination, and other deep shafts.

The fact is that the big lode is still alive and should be pumped out and work at depth resumed. With the water out of the mines there is nothing to prevent the exploration of the lode to the depth of 6000 feet or more below the surface. A great mistake was made when pumping was stopped and the mines allowed to fill with water to the level of the Sutro drain tunnel. In resuming work on the lode at depth the greatest expense will be in draining the shafts, drifts and other openings of the water that has accumulated in them. Most of these openings, however, are at no great depth below the level of the Sutro tunnel and when they have been pumped out only the shafts will remain to be drained. As the water will at first have to be lifted but a short distance, it may be raised very rapidly by putting in a number of pumps to be run by electricity or compressed air. Such pumps may be used until the long drifts, crosscuts, winzes and other openings of the old submerged levels are drained, when it will only remain to pump out the shafts.

Although the mining men of the Comstock have always claimed to be world beaters, they failed to "fill the bill" when they backed out of their line of big shafts at the depth of 3000 to 3300 feet. They then took a back seat and have since been passed by the miners of Lake Superior and Australia. Doubtless they could have gone ahead had the order been given to continue, but the stockholders hungered for dividends and clamored for a return to the old upper levels (above the Sutro drain tunnel), where it was known that large amounts of paying ore had been left behind in the race after depth. So the work of exploration was stopped and the miners set to work on the sure thing to be found in the ore bodies lying high and dry in the old upper levels.

There was no trouble in handling the water at the bottom of any one of those deep shafts. The water that flooded the mines of the south end of the Comstock lode came in at a point 350 feet above the bottom of the Yellow Jacket new shaft, the deepest on that division of the lode. February 13, 1882, an immense "pocket" or reservoir of water was blundered into in a drift that was being run from the Jacket shaft into the Exchequer mine on the 2700 level. The Yellow Jacket shaft was at that time 3050 feet deep; the water from the Exchequer thundered down into it and caused the stoppage of all operations except pumping. The Jacket people pumped and bailed an average flow of 110 miners' inches a day for some days, yet the water gained on them and eventually raised to the source of supply on the 2700 level of the Exchequer. The water then filled all the mines of the Gold Hill end of the lode.

Pumping was continued, however, in order to exhaust the subterranean reservoirs in the Exchequer, till March 28, when the water had been so far lowered that it stood only 950 feet above the 3000 level of the Jacket shaft. Then, as no combined arrangement could be made among the several companies intrusted to continue the work and drain all the mines, the Jacket Company stopped pumping and shut down their works. This stopped all work below the level of the Sutro tunnel in the whole line of south-end mines, and they still remain flooded.

Had proper precaution been observed by the Exchequer people and a drill-hole kept in advance in the drift, there would have been no trouble. In such a situation a diamond drill should have been constantly employed in "feeling ahead" for water. When water was tapped, the drill-hole could either have been plugged up or a pipe and cock could have been put in and the flow drawn off as it could be handled. To blunder into such a big body of water was a piece of very bad management.

The return to the old upper levels was not a bad move, as good bodies of ore were found and an immense amount of bullion was obtained. New bodies of ore were found in the Consolidated Virginia & California, Hale & Norcross, Confidence, Yellow Jacket, Crown Point, Gould & Curry, Savage, Chollar, Best & Belcher and some others. The Con. Cal. & Virginia paid steadily $108,000 monthly in dividends; the Confidence and Hale & Norcross paid dividends in 1888 at the rate of $49,000 to $50,000 a month, and some others paid smaller amounts. At that time nineteen mines were at once producing ore—more than ever before at any one time in the history of the lode. A few examples will show the rate at which some of the mines yilded from the old upper levels after the return to them: Con. Cal. & Virginia, in 1888, for the quarter ending March 31, $921,903; Chollar, $21,795; Confidence, $42,541; Hale & Norcross, $236,047, Kentuck, $13,055; Potosi, $56,461; Yellow Jacket, $121,027. For the quarter ending June 30, the same year, several mines did still better, the Hale & Norcross producing $451,740 and the Confidence $401,293. During the year the Comstock payroll aggregated from $250,000 to $300,000 a month. Thus it will be seen that the stockholders were not much to blame for wishing to cease pumping water for a time and go back to the "fleshpots" of the dry upper levels.

At the time when operations were discontinued in the deep shafts and a return made to the old upper levels the Combination shaft had reached the vertical depth of 3250 feet. At that time there was but one deeper vertical shaft in the world—the Adalbert shaft in the silver mines of Bohemia, which was at that time 3280 feet deep, but has now reached a depth of 3672 feet. At the Combination shaft drifts were run west to the lode at the 2400, 2800 and 3000 levels. On the 3000 level the distance from the shaft to the east wall of the lode was found to be only 250 feet. The lode at this depth was of undiminished width and well mineralized; indeed, the Hale & Norcross Company (through whose ground the drift was run) had a good showing of ore. So much for the story of the lode pinching out at depth. In the Belcher mine, south of the Jacket, excellent prospects were being obtained on the 3000 level when the Exchequer people let it the water and flooded the whole south end of the lode.

In the deepest workings on the leading mines of the Comstock from the Union Consolidated south to the mines of Gold Hill the lode was found to hold its width, and at several points was well mineralized on the 3000 level, as at the Hale & Norcross where they had a good showing of ore when the order for a shutdown and return to the old upper levels came. On the 3000 level of the Belcher good streaks and bunches of ore were making their appearance when the mine was flooded by the rush of water from the Exchequer. Though no rich bonanzas were in sight, there were no discouraging features developed. At the Union Consolidated a change in the appearance of the material composing the vein was observed, which by some was considered unfavorable, as in the assays there was a falling off in silver and an increase in gold. The increase in gold was to the northward, and it is now thought that had work been continued paying gold-bearing quartz would have been developed. At that time, however, gold alone was not being much sought after.

No gold or silver lode has ever been found which showed paying ore continuously in all parts at the same time. Between bonanzas there is always a zone of barren or low-grade quartz. It is probable that another line of bonanzas would come in a short distance below the zone reached in the Union Consolidated, Combination, Jacket and other deep shafts. The indications were that they were on the top of ore bodies at the Hale & Norcross and Belcher when work was stopded. There is nothing to prevent the drainage of the lower levels of either the Gold Hill or Virginia mines. No water exists in the mines above the 1600 (Sutro tunnel) level, therefore all there is to be handled is the dead water which has gradually accumulated in the shafts, drifts and other openings. Pumping operations at the Alta, Crown Point and other mines have shown that a single company was able to lower the water. Had other companies stood in with the Alta or the Crown Point at the time they were pumping the whole of the Gold Hill mines would have very speedily been drained.

At the time the only example in deep mining that Comstock men could look to for light was the Adalbert shaft, Bohemia, and that was only 3280 feet vertical, but 30 feet deeper than the Combination shaft when work was stopped. Now we have at Lake Superior the Calumet & Hecla shaft, 4900 feet in depth; the Tamarack, 4450 feet, the Adalbert, Bohemia, 3672, and several other mines (principally coal) from 3600 to 3900. The Bendigo gold mine, Australia, has reached a vertical depth of 3350 and is still going down in good pay. With advanced methods and improved machinery no one now sees an end to the depth that may be obtained. In other regions the miners are still going ahead, and many of them are now far beyond the point where the Comstocker halted.

By means of the Sutro tunnel a new and lower working surface has been created. The water pumped has only to be raised to this new surface, and through two miles of branch tunnels and many connections with shafts and winzes. There is everywhere a good circulation of pure fresh air. It is as though 1600 feet of ground had been cut out and removed. All kinds of mining work can be done on this new artificial surface as well as above on the old natural surface. This being the case we find that the deepest workings on the Union Consolidated have a depth of only 1750 feet below the new working surface, and that a shaft 3000 feet deep, measuring from the old natural surface, is only 1400 feet deep when measured from the new surface. By means of the Sutro tunnel, its two miles of branches along the lode and its many air connections through shafts and winzes, a base of operation has been established from which it will be as easy to sink to a depth of 3000 feet as it was to sink to that depth from the natural surface.

Flood, Hayward, Mackay, Hobart, with other mining men and many operators in mining stocks that might be mentioned, were in 1891 very enthusiastic in regard to a return to the deep levels; the chances are now as good as they then were—whatever ore bodies were then in the deep levels are still there, and should be looked for. The whole of the mines on the lode need not be opened at once. The Gold Hill mines might be first pumped out, or work resumed in certain sections of the Virginia City division of the lode, starting wherever there was some ore in sight when work was discontinued. As the accumulations of water in the shafts and drifts are not from living streams, to pump them out is like pumping out a cistern. As things now stand, no one knows but that work in the deep shafts may have stopped just on the apex of a third line of bonanzas richer than any found above.

SOMETHING unusual in mining is reported from the Lake Superior, Mich., copper district, where deep shafts are common. The Quincy Mining Co., according to local reports, is to "dig a shaft 4000 feet high." A new shaft 4000 feet in depth at an angle of 43° was recently decided upon, and, after considerable discussion, the plan of Manager Harris was acted upon, viz: to begin 4000 feet below the brow of the hill and start drilling upward to the surface for the distance mentioned, which will constitute a gigantic upraise, even if not entitled to be called a shaft.

Placer Mining by Machinery.

Written for the MINING AND SCIENTIFIC PRESS.

The oldest of all engineering problems is how cheaply can earth or gravel be handled. It interested alike the first tiller of the soil and the first placer miner. Where all natural facilities are present—ample grade and "dump," sufficient water with good hydrostatic pressure—gravel can be handled more economically by hydraulic methods than by any other means yet devised. These natural advantages were utilized by the pioneer miners of California to work the auriferous alluvial deposits of the shallower gulches and bars, and enabled those who followed them to wash down mountains of alluvial detritus to recover the gold. When the most favorable of these deposits were worked out, the early miners sought new fields in British Columbia, Boise Basin (Idaho), Alder Gulch (Montana), and many other places where favorable conditions for placer mining existed. But in almost every district where work was done considerable areas of auriferous gravels were left unworked, owing to the deposits being located in the beds of streams or from their lack of sufficient grade and "dump," or on account of there being but little available water. The working of such deposits attracted the attention of the mechanical engineer in 1857, when the first dredging plant was placed in one of the rivers in California to dredge for gold. Since that time almost every form of device for handling gravel has been used in the multifarious attempts to work both drained and subaqueous deposits.

Millions of dollars were expended in this country between the years 1857 and 1894 in the mechanical appliances adopted to work gold-bearing detrital deposits, resulting mostly in blighted hopes and depleted pockets, and there is probably not a single field for the application of mechanical devices where so many and varied attempts were made at so great an expenditure of time and money that resulted in so little progress being made as in that. In fact, the successive failures only demonstrated the inadequacy of many of the appliances and methods employed.

It is not the purpose of this article to discredit or unduly criticise any honest effort made in the past toward working auriferous deposits by mechanical means, but to review briefly some of the methods adopted which have so often resulted in disappointment and loss, and endeavor to point out lines which can be safely followed, insuring success in proportion to the care used in adopting proper mechanical methods to work such deposits. Until within a comparatively short time the results of almost every attempt have proved unsatisfactory, through either inability to recover the gold with the gravel when working under water or failure to recover the gold from the gravel effectively and economically when working drained deposits.

The latter difficulty has been overcome, as will be shown; and, where the bedrock is soft, some progress has been made toward surmounting the first obstacle. But how to recover the gold from hard, rough bedrock, in submerged work, remains the same complex problem. Previous to 1894, these plants were generally designed by mechanical engineers, whose early education in placer mining had been neglected, or by placer miners, who knew but little of the practical application of mechanics, and sometimes by promoters, whose chief aim was profit to themselves regardless of loss to others. For subaqueous workings, dipper dredges have seldom produced satisfactory results, owing to it being impracticable to make the door of the dipper or shovel to close tightly, consequently a considerable percentage of the gold would wash out with the water and could not be recovered. This difficulty has been somewhat overcome by working down stream instead of working against the currents, which has been so generally practiced; and in breaking or disturbing the gravel under water, the gold would settle to bedrock, where the dipper could not recover it unless the bed was clay or decomposed rock. Dredges, fitted with clam shells and grappling devices, have failed for the same reasons. Suction dredges and centrifugal pumps, of which probably a greater number have been tried than any other single device, have demonstrated that they would pump large quantities of water, some gravel and but little of that most sought for—gold. Some of the best authorities on centrifugal pumps still contend that they have great possibilities in handling solids. But the placer miner had better let those experts demonstrate the capacity and efficiency of such pumps in auriferous gravels at their own expense. Elevator or ladder dredges have been working successfully in New Zealand rivers for some time, and some of these plants, located in Grasshopper gulch near Bannack, Mont., are working profitably; but the financial results attained by them should probably be credited more to the quantity of gold in the gravel handled than to perfection of design or high standard of the mechanism used. It is not a difficult problem to work gravel profitably, where it contains several dollars per cubic yard, and some of the Grasshopper gulch deposits are as rich in gold as the Klondike alluviums. Some of these plants contain a greater number of engines and more machinery than is necessary to do the work properly. Better results could be attained with less complicated machinery. When a large centrifugal pump is used on a placer mining dredge, for the sole purpose of disintegrating and washing the clay from the gravel, the designer of such plant has something yet to learn in placer mining engineering. Some of these plants have been remodelled several times, and improvements in their design and the machinery used are certain to follow. An elevator dredge has recently been placed on the Yuba river, Cal., which shows decided improvement and demonstrates the value of experience with such plants, as the designer has spent several years in that line in New Zealand.

While we have not all the desired data regarding the cost of subaqueous workings under the varying conditions existing in different localities, sufficient has been done to demonstrate that, where auriferous gravels are underlaid with clay or decomposed bedrock, plants can be constructed to excavate and wash the gravel successfully.

There have been many attempts made to work such deposits with standard steam shovels and auxiliary machinery, such plants having generally included from two to four steam boilers, two to five engines and one to three centrifugal pumps each. They have mostly proved so inefficient and expensive to operate that they were abandoned, although frequently working rich gravel. It has been demonstrated that such deposits can be worked very profitably with a properly designed plant, having but one steam boiler, one set of dredging engines and without any pumps whatever. Hydraulic gravel elevators have frequently been used in endeavoring to overcome obstacles, caused by the failure of natural forces, to provide sufficient grade and proper space for "dump." Under the most favorable conditions, a few of these devices prove efficient and the results attained are profitable. But a greater number failed owing to the natural requirements for their successful operation being so great and the requisite combination of conditions so seldom found. Whether auriferous detrital deposits, where the bedrock can be drained, should be worked by traction dredges placed on bedrock, or by floating dredges, requires but little discussion to demonstrate that practically everything is in favor of the former method. For working such deposits few advantages in favor of a floating dredge can be established. Under some conditions it will handle the material at less cost per cubic yard—a matter of subordinate economic importance, when in almost every instance the value of the gold, not recovered from bedrock by a floating plant, is far in excess of any lessened cost of operation; and where the alluvial deposits are underlaid with hard, rough bedrock—Nature's best riffles—generally not more than 50% of the gold can be recovered by subaqueous working. It is on and in such bedrock where the greater quantity of gold is to be found. The water is necessarily made muddy by the operations, which are entirely blind, and under such conditions it is absolutely impossible to clean or crevice the bedrock. The area of unworked auriferous gravel deposits which can be drained is much greater than that below the drainage level. Drained gravels can be "prospected" and their values determined at comparatively small cost, while it is practically impossible to properly "prospect" submerged deposits; hence, the working of drained gravels is a much safer and more profitable proposition, generally, than the exploitation of subaqueous deposits can be. Nearly all unworked auriferous alluviums in old placer mining districts have a top burden of barren clay and gravel, and in many localities there is but little available water for sluicing. Under such conditions it is worse than useless to wash gravel that has no "pay" in it.



FIG. 1.—DIPPER DUMPING "PAY" GRAVEL INTO CAR.



FIG. 2.—DIPPER DUMPING TOP BARREN MATERIAL AT SIDE OF EXCAVATION.

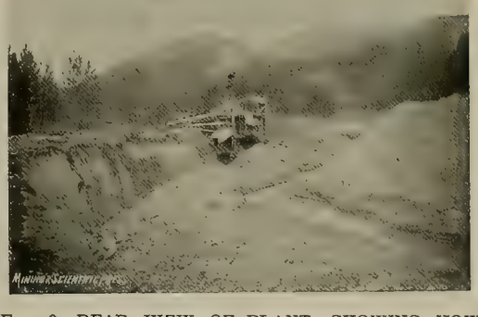


FIG. 3.—REAR VIEW OF PLANT, SHOWING HOW ALL MATERIAL IS DISPOSED OF.

Plants to work such deposits should be designed to strip and dispose of the barren material with the greatest economy at the side of the excavation, washing only the lower stratum of gold-bearing gravel. This feature has not had proper consideration heretofore, as all plants have been constructed on lines that all material excavated had to be washed or run through sluices to dispose of same. This has proved to be a great error and a barrier in the way of progress toward obtaining better results. The outcome of the many attempts to work drained auriferous detritus by mechanical means in the past has proved an inviting field for criticism, which many have taken the fullest advantage of without offering in return an idea or suggestion of value. In view of this, it may be considered rash for a writer to attempt to lay down definite lines and claim they can be safely followed, even in the light of past research. The results of long and dearly bought experience gained in these experiments would indicate that a plant to operate successfully in such deposits and meet the great variations in their topography and conditions should embody the following principles: First—It should be compact and completely self-contained, not comprised of several parts connected together on one or more tracks, and should be capable of propelling itself readily in either direction. Second—It should be constructed without jack arms, spuds, or side supports of any kind. Third—It should be capable of stripping any superimposed burden of barren alluvium and disposing of same economically without washing it. Fourth—The digging or excavating machinery should be of a type which experience has demonstrated to be the simplest, strongest and most effective. Fifth—The excavated material should be elevated to a sufficient height before being washed, so that all "tailings" can be disposed of by gravity alone. Sixth—A method of disintegrating and washing the "pay" gravel and saving the gold should be adopted whereby long sluices can be dispensed with.

A plant was erected on these lines in Washington gulch, Deer Lodge Co., Mont., by W. M. Johnston & Co. of Chicago early last spring, of which the general plan, the washing, and various other devices

used were originated by the writer, and is the outcome of years of evolutionary experiments. It has worked now steadily for more than seven months and the results have been satisfactory in every way, and being the first plant of the kind, strength rather than harmonious lines was considered in its erection.

It is simple in construction, does not get out of working order, and has made a better record than any similar plant ever placed in a drained deposit of auriferous gravel. The plant is termed a traction dredge and is carried on four bogie trucks, which move on double narrow-gauge tracks resting on bedrock. The frame is 30 feet long, 18 feet wide and 22 feet high. The boom is 40 feet long and carries a dipper or shovel of 1¼ cubic yards capacity and handles from 50 to 80 cubic yards per hour. On the main floor of the plant is located 150 H. P. steam boiler and a set of dredging engines of similar capacity, which furnish all the motive power used for excavating the material, handling the car, operating the washer and screen and propelling the plant forward. On the floor above the boiler and engine is located a revolving cylindrical washer and screen; below the screen and extending back and outward are located the sluice boxes, the rear part of which is supported by steel cables and turn buckles, so that any desired grade can be obtained. The car runs on an incline extending from the top of the plant to the solid bank at the side, resting there on a shoe, or on rollers.

Fig. 1 (see opposite page) shows the plant working in a deposit of compact clay and very heavy gravel, 16 to 17 feet deep. The dipper is swung to the left, having just dumped its load of "pay" gravel into the car resting on the foot of the incline.

Fig. 2 shows boom swung to the right and the dipper wasting the barren material on top of the washed debris in the first cut excavated.

Fig. 3 is the rear view of the plant when working on perfectly level bedrock, showing all debris and tailings left where deposited by gravity alone, nothing but water passing down the cut.

In operation the dipper is filled alternately from the upper stratum of barren gravel and the substratum of "pay" gravel, delivering the first to the "dump" on the right and the latter to the car, which is then drawn up the incline and dumps its load of gold-bearing material into a hopper out on top of the plant; from there it passes automatically to the washer, situated immediately below, where complete disintegration and washing is effected. All rocks and coarse gravel passes from the lower end of the screen, at the rear of the plant; the finer gravel, sand, water, etc., passing through the perforations into the sluice boxes, where 97 to 98% of the gold is recovered. Near the tail of the sluice is a sand trap and valve, which separates the solids from the water, dropping them underneath, forming a dam which causes the water to flow away from the plant, regardless of how flat the ground may be. In fact, the plant works equally as well on an up grade, a level or on a down grade.

It excavates a cut 45 feet wide and 7 feet long before moving forward; requires but a few minutes to move up and begin working again, as there are no jack arms or separated sections of the plant to cause delay in moving. The plant can be readily turned to either side to follow a narrow "pay streak" or gulch, as shown in Fig. 3. Water for washing and sluicing is brought from an elevated ditch parallel to the plant by pipe and hose, and is conveyed to perforated pipes in the washer and to the hopper. This plant requires eight to nine men to operate it, and less than one and one-half cords of fir wood is used for fuel each ten hours. The cost per cubic yard in operating will depend on the local cost of labor and fuel and the capacity of the plant, as a plant of large capacity requires no greater number of men to operate it than a smaller one. The average grade of the property worked in Washington gulch is about 19 inches to 100 feet apart, and the supply of water is very small, having been for the greater part of the season between 20 and 25 miners' inches. The capacity of the plant has been limited to the quantity of water available, and the results attained in washing and sluicing the gravel have proved very interesting, probably more so than that of any previous work done in the same line. About five-eighths of the material excavated is not washed. The other three-eighths—frequently amounting to 300 cubic yards of "in place" material—has been thoroughly washed and sluiced in ten hours with this quantity of water by the method adopted for accomplishing same. However well the general plans of a plant may be designed for the purpose intended, if the mechanism is weak or deficient expensive delays are certain to occur. This plant has worked steadily for more than six months, with the exception of being idle but two days, owing to breakage, and the total cost of replacing the broken parts was less than $25—a record equaled by few machines employed in heavy excavating work. To summarize: This plant will work successfully in the most level deposits; will strip and dispose of barren superincumbent material in the most economical manner without washing it; will wash thoroughly more gravel with a given quantity of water than can be done by any other method; all tailings are disposed of by gravity alone and remain on the property worked. This is the first plant constructed on this plan. Other plants are now being erected with modifications and changes to meet the different conditions of the deposits to be worked. There is ample elasticity to the method and general plan, so that plants can be designed of any desired capacity, and to meet successfully any conditions found in auriferous alluvium deposits, except they are of unusual depth or where located under water. The field for mechanical placer mining is a broad one, and will prove very profitable, with little chance of loss, where entered upon and conducted judiciously; but a plant should not be purchased unless a similar one can be shown to have worked successfully, and only then on the broadest guarantee from thoroughly responsible parties that it will meet all the conditions required of it, as until recently the manufacturers of machinery have had a monopoly of the profits arising from expenditures in their line.

Former experience is not necessary for the successful management of such a plant after being erected and properly placed at work. But to insure success, however, in mechanical placer mining it is very important that the detailed conditions of the deposits to be worked should be fully known and the best methods of handling, washing and sluicing the gravel be adopted and put into practice by those having thorough experience in that line, as only in this way can efficiency and economy in working be obtained, which are so essential to success.

WM. M. JOHNSTON.

Washington Gulch, Mont., Dec. 15th, '97.

Siberian Mining Fields.

The following is extracted from a letter recently received from Ross B. Hoffmann, who is assisting his father, Chas. F. Hoffmann, in exploring portions of the mining field of Siberia. They left here about a year ago under engagement for three years as mining engineers for a Russian branch of the Exploration Company of London. Mr. Hoffmann says:

"We first visited the placers at the headwaters of the Selemdja river, on the branches Kharga and Little Nairgen, where we spent three months making detailed examinations.

"The whole of that country is covered with a drift of loose angular fragments of rock—not only the valleys, but the highest peaks, 1000 feet or more above. This drift is covered with a thick mat of moss and forests of small birch, larch and pine. During the winter everything is frozen solid and covered with snow, but in the spring and summer the entire surface, valleys and hills as well, is a marsh. The country rock can only be seen in places along the banks of the rivers and in the bottoms of the shafts and worked-out ground. This is mainly mica schist, with occasional masses of diorite and some quartzite. The drift is of the same materials and in places contains considerable quartz.

"The placer claims are located in the valleys and ravines, which form rather broad, flat bottoms—quite different from the V-shaped canyons of California. There are many remaining accumulations from lateral and terminal moraines to be seen.

"Sections across these valley placers show as much as 700 feet width of flat bedrock (with slight grade down stream). Upon this rests a characteristic bluish colored deposit of mica schist fragments, mixed with sand and clay, entirely unstratified and unwashed; average depth about 4½ feet. This contains most of the gold, the richest streak sometimes being near to the top of the deposit, and not on the bedrock. This streak is supposed to be a concentration from above.

"On top of this is a loose deposit of gravel showing stratification and containing traces of gold. This gravel, if it may be called such, is not well rounded, like our California gravels, and was probably derived from the lateral moraines and drift above. Finally, the whole is capped by an accumulation of vegetable matter, forming a peat or turf, covered with moss, etc.; depth, from 1 to 5 feet

"In one of the claims the bedrock is a soft mica schist, with many seams of quartz, and the gold is both in the clay deposit and the upper foot or so of the bedrock.

"The present streams seldom cut through the thick peat capping. They contain well-washed gravel, including pebbles of granite, porphyry, etc., indicating that they are cutting at points near to their heads.

"Our next trip was to the headwaters of the Amgoun river, about 250 miles east of the Selemdja placers. Here the formation is about the same, being still in the region of glacial drift, but nearer to its edge—hills not covered so deeply with drift, and evidences of old moraines disappearing; country rock and clay schist; upon this, 1 to 8 feet depth, unstratified mass of clay schist and quartz fragments in clay and sand; then varying depth loose deposit, partly washed and stratified of finely broken up clay schist; then 6 inches to 1 foot depth layer of shale; then 1 to 2½ feet depth strata of clay and sand; finally, capped by turf or peat 7 or 8 feet thick. The gold in some of the claims is evenly distributed over the area, in others the pay is in the unstratified deposit above the bedrock. The gold is both fine and coarse, and is not washed—no polished surfaces, only some of the edges slightly rounded. The fineness is from 845 to 890.

"Regarding the drift above referred to, there is no available information concerning its extent. We were near its edge at the Amgoun mines, passed out of it on our trip down the Selemdja, saw no trace of it on the foothills of the lower Boureia, and found it again covering one of the islands of the Japan sea, not many miles from Vladivostock. Here a portion of the deposit was drifted, with little success, however. There are many fine seams of quartz in the country rock, some showing by test traces and high values in gold. This condition probably exists under the drift in many places throughout the country, and may be the source of placer gold. The value of the gravels has been ascertained by test in many of the claims. The areas prospected ranged in length from one-quarter to three and one-half miles, in width from 160 to 385 feet, and in depth of pay deposit from 3 to 4½ feet. The average values obtained were from $1.37 to $4.28 per ton.

"The expense of working varies greatly, according to locality and the amount of overlying barren deposit to be removed—ranging from about $2.80 to $4.50 per cubic yard (calculate about two tons to the cubic yard in place)."

The letter adds: "If you go north, take for summer outfit precisely what you would use in California, with the addition of rubber boots and rubber raincoat. For the winter, assume that underclothing gives no warmth, and depend upon fur coats, caps, boots, etc. Felt boots are the most comfortable, but don't be afraid of having them several sizes too large. At the mines it is handy to have a sheepskin coat, heavy as possible, with the wool inside, reaching a little below the knee, and long sleeves that you can draw your hands up into; woolen scarf for the throat."

Hydraulic Mining.*

NUMBER VII.—CONCLUDED.

The Undercurrent.—This is a large, shallow kind of sluice, from 20 to 50 feet wide and 40 to 50 feet long, with sides 16 inches high, set on a heavy grade at the side of and a little below the main sluice, the design of it being to relieve the latter of the finer material and permit of its handling the remainder more effectually. This structure is located at a point where the grade is too spare for a drop in the main sluice, across which there is here set an iron grating. Through this grating the finer material drops into a box paved with blocks and set at right angles to the main line of sluice; the coarser stuff which passes over the grating being picked up by the sluices set on a lower level, the box meantime discharging its contents through a chute into the undercurrent. This chute, which is paved with cobbles and set with dividers of wood whereby the flow is distributed evenly over the undercurrent, has a 2 to 3 per cent grade and narrows toward its lower end.

The undercurrent, the bottom of which is made of 1½-inch plank, tongued and grooved, is set on an 8 to 10 per cent grade. It is paved with cobbles or small blocks. The gravel escaping from the undercurrent is caught in a side sluice and returned to the main line.

Formerly a sort of subsidiary undercurrent, set beside and below the principal structure, was in use, but they have latterly come to be discarded.

Miscellaneous Items.—In size, hydraulic claims are apt to cover a large area. Longitudinally, they extend from half a mile to four or five miles, running with the course, or supposed course, of the Pliocene or other channel on which they are located. As these channels are sometimes very tortuous, these claims require to be of considerable width in order to cover all their bends and angles. The titles of all the large and many of the smaller companies consist of United States patents. The right to carry their ditches over the public land is secured to the miners by law.

The value of the gravel piped off in hydraulic washing is measured by either by the cubic yard, by the number of inches of water used or by the yield per acre, the latter method of measurement being adopted where the banks are shallow and therefore of large area. A cubic yard of gravel in place varies in weight from one and one-half to one and three-fourths tons, the weight when broken down being somewhat less.

* Begun in issue of Dec. 18th, '97.

R. N. PEARY, the Arctic explorer, in reply to a letter in regard to the moon at the extreme north, says: "The length of the lunar month in the Arctic regions is the same as here, but, as a result of the higher latitude, the moon is above the horizon continuously for several days at a time of full moon. In the latitude of my headquarters on the northern shore of Whale sound, in the latitude of 77 degrees, 40 minutes north, each full moon remained above the horizon for eight or ten days. The length of the winter in this latitude is from the 26th of October until the 14th of February, and there are consequently three winter moons."

Date of Discovery of Gold in California.

To the Editor:—In the Golden Jubilee edition of the Mining and Scientific Press (Jan. 29th), page 111, appears an article entitled "The Correct Date of Marshall's Discovery." We have read it carefully, and we gave especial attention to the statement made that Marshall, Sutter and the Weimers agreed that the 19th day of January, 1848, was the day of discovery. For many years this date was accepted as correct and beyond dispute, simply because unquestioned. Marshall kept no diary or memorandum to assist him in remembering the correct date, and several years had passed by before he was asked to name the date.

It was the ground sluicing used to deepen the tail race that exposed the gold, and none of the men at the mill had ever seen river gold, or had any knowledge of placer deposits. Marshall's companions did not stay long in California; when they had dug a few hundred dollars' worth of gold they went to Utah, where they separated and settled down for life. Marshall gave a clew to the day when he found gold by saying that, although he forgot what day it was, he went to Sutter's Fort four days afterward and showed Sutter what gold they had secured. Sutter's journal records Marshall's arrival from the mountains "on important business" on the 28th of January, 1848. Sutter's journal is now in the possession of the Society of California Pioneers. General Bidwell and William F. Swasey at different times were employed by Sutter to write in this journal, and have subscribed to its authenticity. At the time when Marshall found the gold Sutter made the entries in the journal. John S. Hittell made the accidental discovery that Bigler and Smith kept diaries while working at the sawmill. Mr. Hittell had in September, 1885, delivered the annual address before the Society of California Pioneers, and referred to the 19th day of January, 1848, as the date when Marshall found gold. Hittell had learned that several survivors of Marshall's party at the sawmill were in Utah, and he sent a copy of his address to Bigler, requesting him to correct any errors he might notice, and inform him. Bigler replied that the date did not agree with his diary. Later Mr. Hittell corresponded with Azariah Smith, whose diary corroborated Bigler's statement. Since then another of Marshall's party, James S. Brown, adds his testimony to that of the others, that the 24th of January was the date of discovery.

The supposition that Marshall kept secret the finding of the gold for some days, is not warranted by the evidence of his companions. The first flakes or scales, (thin, cucumber-seed-shape), gave no hint of rich deposits of placer gold to these men, who had never mined for gold in any diggings, wet or dry; they were not even sure that the metal was gold. The survivors of Marshall's party in Utah all agree that the first gold found was of small value. The second night's sluicing of the mill race yielded more of this worn river gold, and the total amount collected in three days was three or four ounces.

The place where the first gold was found at Sutter's mill was not rich as compared with many places above and below, nor did any of Marshall's party find any rich placers or secure more than moderate amounts of gold for their early occupancy of the country. Captain Sutter made an application for a grant of the "gold mines" located at the sawmill, but was unsuccessful in securing the grant. The employes agreed to respect Sutter's right to hold it for his sole use, but the discovery of other and richer diggings diverted the attention of the gold hunters, who soon had prospected the rivers and gulches for a hundred miles. The uncertainty and confusion concerning the date of Marshall's discovery of gold resulted, first, from the fact that Marshall did not keep a diary, and, secondly, too much time had elapsed before he was asked to remember it. I saw both Sutter and Marshall in July, 1849, and had conversations with both of them. I must confess that it never occurred to me to ask either of them on what day Marshall found the first gold. Weimer and his wife were well known people in Sutter's Fort, where I lived in 1849, and also in Coloma, where I also spent some time in the same year. Their statements regarding the first find being a gold nugget, and its being boiled in a kettle of soap, etc., to determine its value, was not heard of by me at Sutter's Fort or Coloma in 1849.

The excitement created by the rush of all classes of people to "the diggings," the disorder resulting from the interference with every kind of business established by Sutter on his ranch property all contributed to cause confusion. At any time the correct date of discovery of gold at the sawmill could have been established by coupling Marshall's statement, that four days afterward he carried the gold to Sutter's Fort, with an examination of Sutter's journal. This was sufficient proof of the exact date without considering the proof obtained later from Bigler and Smith. But when the combined proof of these records of Sutter, Bigler and Smith corroborate Marshall's statement as to the number of days which intervened before Sutter's journal could be used to furnish satisfactory evidence of *recorded* events, then the chain of evidence becomes too strong to be broken.

To perpetuate an error under these circumstances would be contrary to the purpose of the Society of California Pioneers, whose constitution provides that one of its objects is "to collect and preserve information connected with the early settlement and subsequent history of the country." Every committee that has been appointed by other Societies of California Pioneers to investigate and report on this matter of Marshall's discovery of gold has been permitted to examine the records of the Society in this city, and every committee, after an examination, has unanimously reported that the 24th day of January, 1848, was the correct date. There is absolutely no escape from this conviction. Marshall did not want to deceive; he simply failed to remember when asked eight years after the event. Weimer and wife made no record of the finding of gold at the time when it was found. Bigler and Smith were never asked, and their diaries remained obscure and unquoted until John S. Hittell's statement that on January 19th Marshall discovered gold caused a reopening of the whole question.

Edw. E. Chever.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER III.

By Geo. F. Becker.

The Main Reef series comprises several beds of conglomerate at no great distance from one another. The number of these auriferous strata is not constant, and they receive different names in different parts of the district. The beds most often heard of are South Reef, the Main Reef Leader, and the Main Reef. The last named is the widest, usually several feet, and sometimes as much as 12. As a rule, gold is not uniformly distributed through it, and it is not very rich. In most mines only a part of this bed is extracted, and in some it is left standing. The Main Reef Leader is a thin bed lying above the Main Reef at a distance of a few feet or a few inches. It is almost invariably rich. It averages about 15 inches in thickness. The South Reef is commonly separated from the Main Reef Leader by 30 to 100 feet of quartzite. This reef is also thin and commonly very rich. In some parts of the district there are half a dozen valuable reefs, and even more. Whether any one bed could actually be followed by a drift continuously for twenty or thirty miles is very doubtful. It appears to me rather that the beds of conglomerate form a group of very flat lenticular masses, any one dying out in strike, but usually being replaced in the floor or roof by an equivalent bed. In a number of cases one of the reefs is "split" by sandstone or quartzite, and they are known to die out locally. It has repeatedly happened in crosscutting that profitable banket has been unexpectedly encountered, and that such strata were only locally developed. But, although the persistency of the reef is apparently exaggerated on the Rand, there is no doubt that the beds are much more persistent than such beds generally are, and that single strata can be followed continuously for several miles. So long as gold-bearing pudding stones occur, it is of small consequence whether they are the same as, or equivalent to, the banket in the type localities. All the reefs of the Main Reef series carry gold, and portions at least of each seem to be workable.

As has been indicated above, auriferous banket occurs in other districts besides that of the Witwatersrand. It is one of the great problems of economical geology in the Transvaal to trace the Lower Cape, with its bankets, to the eastward and the westward. This task is a difficult one, for various reasons. The Lower Cape was much disturbed and faulted before the Upper Cape was deposited; the larger part of the surface is occupied by Upper Cape and Karoo beds, concealing the Lower Cape; the Karoo is substantially undisturbed; finally, the country is a peneplain, and is rarely dissected to such an extent as to expose the rocks. Much more than nine-tenths of the country is so level that one can drive about regardless of roads, as on the Laramie plains, and this area is covered with grass.

The Heidelberg district is so closely associated with the Witwatersrand proper that the two are regarded industrially as one. To the southwestward the Klerksdorp and the Pochefstroom districts carry auriferous banket, and observers seem agreed that the Lower Cape is represented in these localities. A wide belt of Upper Cape and a granitic intrusion separate the Witwatersrand from Pochefstroom. In 1895 these western districts produced over 90,000 ounces of gold, worth $1,500,000. To the westward of the Heidelberg district the country is a coal-bearing one, and the underlying bankets have been discovered only at certain points; but in Swaziland and Zululand auriferous banket certainly occurs, and gentlemen very familiar with the Johannesburg deposits assure me that all the essential peculiarities of the Lower Cape are there reproduced. At a point called Denny-Dalton, in Zululand, accessible from the railway station of Dundee in Natal, some work has been done on these deposits. The trouble with the Zululand banket is said to be that it runs only four or five pennyweights, so that under present conditions there is no profit in it. It need not be said that richer patches are very likely to occur in a $4 reef.

Marine Origin of Banket.—The strata of the Lower Cape seem to be evidently marine, and they have usually been so considered, but Mr. Henry Lewis suggests that they are lacustrine, and Mr. Schmitz-Dumont is reported to have pronounced the banket fluvial. Geologists are, of course, entirely familiar with the characteristics of lake and river beds as distinguished from marine deposits, but it seems desirable that this information should be more widely spread among laymen interested in the Witwatersrand, and this is my excuse for dwelling somewhat on the subject.

Marine gravels are distinguishable from river gravels even in very limited exposures. The average character of the pebbles is quite different in the two cases, because of the difference in the agencies by which they are shaped. In rapid streams rock fragments are turned over and over, and are reduced to their final shape by great numbers of small bruises which are almost uniformly distributed over the surface. The result is to produce a symmetrical ellipsoidal pebble. Along a sea beach, on the other hand, the waves, when not too violent, drag the pebbles to and fro without turning them over, this process often continuing for a long time with no interruption. The pebbles are thus ground down more on one side than on the other. Hence, as may be seen on almost any beach, there is in marine gravels a considerable proportion of muffin-shaped pebbles, much flatter on one side than on the opposite one.

The pebbles in river deposits also differ from those in marine deposits in their arrangement. In streams the thinner pebbles are tilted downstream and overlap one another like roofing slates. This can be verified in any rapid brook, or even in the runlets of a recent shower. It is also easy to see that this must be the result, for if one were to drop a disk into a rapid stream it would oppose its broad side to the current as it sank, in accordance with well-known mechanical principles, and then, reaching the bottom, it would strike upon its edge, so that the running water would tilt it over downstream.

In ancient gravels which have been disturbed since their deposition, the former direction of the current can be inferred from the overlap, or the "shingling," or imbrication of the pebbles. Confusing irregularities occur only when some strong eddy has locally produced a backward flow. Beach gravels are also imbricated, but only for a few feet in one direction; then the direction changes. The process may be watched on modern beaches, where each wave generates a local current, the effects of which are partially or wholly obliterated by the next. This capricious imbrication is characteristic of beaches.

In the banket of the Rand the pebbles are to a very large extent unsymmetrical, showing one flattest side. This is best seen near the croppings; for example, in the upper levels of the Simmer & Jack, where many of the pebbles have been loosened by the oxidation of the encrusting pyrite. The primitive asymmetry is easily distinguished from subsequent dynamic molding. The arrangement of the pebbles on the Rand is, furthermore, not one of regular shingling, but of capricious imbrication, and this is exhibited in almost any drive or stope.

Streams which have only pebbles in their beds must be rapid, and rapid streams cut into the rock over which they flow. Hence river gravels occur in channels and the gravel lies unconformably on the incised rock. The stratification of stream gravels is always very irregular and is distinguished as "stream bedding" or "cross bedding." Marine beds are almost always found in series, the members of which are regularly stratified and are conformable with one another. As a rule, an offshore area receiving sediments sinks under the weight, making room for successive nearly horizontal beds. Thus, in marine gravels there are no confining channels, and in most cases the conglomerates are conformable with sandstone or shale strata. There are local developments of stream or current bedding even in marine beds, but these are subordinate to the regular stratification in beach deposits, while regular, persistent stratification is absent in river gravels.

On the Rand the Main Reef series is underlain by a series many thousand feet in thickness, and the reef appears to me thoroughly conformable with this immense mass of rocks. The stratification is so perfect that a single pebbly stratum only a few inches in thickness can be traced for many thousand feet, and perhaps for miles, along the strike. No such phenomenon was ever seen in rivers. Neither is there any trace of a river channel. The backs opposite the Robinson Deep must measure over a mile, and there is no trace of a channel wall; indeed, were there a channel it must contain the whole Lower Cape series, which cannot be less than four miles in thickness, measured in a direction perpendicular to the stratification.

(*To be Continued.*)

* Eighteenth Annual Report Mineral Resources of the United States.

Geology of the Yukon.*

NUMBER II.

Parallel with the axis of the geanticline, the chief drainage was carried, and along this line of drainage, which has migrated somewhat down the general dip to the northeast, the Yukon river now flows. By the erosion of this and other streams the present hills, mountains and valleys began to be carved out. Since the period of this revolution the interior of Alaska has probably never been long beneath the waters of the ocean, and therefore the only subsequent deposits are scattered and are of fresh-water origin; although nearer the shore marine deposits are found, showing that during the Miocene time the land area was smaller than at present.

In later geological times, however, the land has been subjected to repeated oscillations which have involved great changes of elevation, but have been without any great amount of attendant folding. Thus, after atmospheric agencies subsequent to the post-Kenai revolution had fashioned the topography after the same general pattern as that at present existing, the elevation caused the acceleration of the streams and the great canyon-like valleys to be cut. These are still prominent features in the topography. During this period also, which was probably mainly in the Pliocene, eruptions of olivine basalt took place from separate vents at various localities.

Subsequent to the eruption of the Canon lake valleys, the total land mass sank beneath the sea, as is shown by terraces, which represent probable shore lines. The scattered gravels found on mountains and in valleys all over the country seem to be one of the effects of marine action at this period; other than these, however, no marine deposits have been found, and the submergence may have been more or less closely contemporaneous with the maximum extension of the great cordilleran glacier, and this may explain the absence of glaciation and also of decayed rock over so large a portion of Alaska. The cordilleran glacier soon retreated, however, and the land began to rise. On the retreat of the sea the country, being still low, the valleys of the old streams were in part occupied by numerous lakes, the water accumulating in consequence of the sluggish drainage, and baisins were formed in consequence of local depression or irregularities of elevation. In these lakes mud or silt rapidly accumulated. With increasing elevation some of the lakes became drained and others were reduced in extent. The streams became more rapid and the valleys began to be excavated again. This is the condition of things at present, and it is probable that the elevation is still going on in a general way.

Auriferous quartz veins were formed in the older rocks at different intervals and their formation was accompanied in a general way by the development of schistosity, so that the veins may be divided into an older sheared and a younger unsheared set. These veins are found chiefly in the schistose sedimentaries, the Birch creek and the Forty Mile series. They are occasionally found in the fundamental granite, and the younger set is sometimes found in the igneous and pyroclistic rocks of the Rampart series. In many places it has been noticed that the younger set of quartz veins, which, on account of their unaltered condition, can be more easily studied than the older set, grade into acid dike rocks, such as aplite. From these and other considerations, a theory of the formation of the auriferous veins has been formulated, namely, that they represent the final stage of a gradual process of rock consolidation, the rocks representing the other stages being found in the same districts. The gold is supposed to be a nearly universal constituent of rocks, and to have been a part of the general magma; and its abundance in some quartz veins is supposed to be due chiefly to the free circulation attending deposition, and perhaps broadly to some special adaptation which gold may possess for solution in siliceous and alkaline fluids, which are conceived to be the final residue of rock solution.

In many places the rocks have been sheared, especially along certain defect portions, and thus shear zones are produced. In some of the formations, notably the Rampart series, there has been no regional schistosity, and therefore these local shear zones traverse an otherwise nearly massive rock. The zones have naturally been selected as channels by circulating waters, and along them a concentration of metallic minerals has often been affected by the deposition in crevices and interstices of materials old in solution. These concentrations or impregnations may in some cases contain gold and silver along with other metals.

The rocks of the Rampart series have been exposed to atmospheric erosion since the time of the formation of the Mission creek series, and probably before, as shown by the conglomerates. This series, however, and the older rocks were first exposed to active erosion subsequent to the post-Kenai revolution. At this period the wearing away of the Yukon geanticline exposed the old rocks in the general broad belt which extends in the northwest and southeast direction for at least 1000 miles. Subsequent erosion has operated only to broaden this zone, which at present constitutes the gold belt of the Yukon district of Alaska and the Northwest Territory. Ever since the beginning of the period of active erosion, the gold-bearing quartz veins and other metallic accumulations have been broken up and carried away by the waters with other rock detritus, and from this heterogeneous mass, the gold being the heaviest, has always had a tendency to concentrate mechanically at the bottom of any deposit. Thus at the present day it is found in the bottoms of the gulches and on the bars of rivers. The older accumulations of the detritus also contain concentrated gold, and these probably furnish some supplies to the more recent accumulations.

The gold of the Yukon district is chiefly derived from quartz veins, which are found most abundantly in the schists of the Forty-Mile and Birch creek series, although not infrequently in the igneous and pyroclastic rocks of the Rampart series. It is also derived—although to a far less extent—from impregnated shear zones, which occur especially in the Rampart series. Of the quartz veins, one set is sheared and one unsheared. The first is difficult to follow, for the veins are broken and non-persistent. The veins of the second set are often persistent and wide, and in some cases may be mined profitably. Impregnations along shear zones may also in some cases be sufficiently rich in metallic minerals to form ores under favorable conditions; and the rock in the region of these shear zones is often unfolded so that these ore beds may be expected to be comparatively persistent.

The quartz veins are connected with dikes, chiefly light-colored, crystalline rocks, such as granite and aplite. This should be kept in mind in prospecting, and auriferous veins may be located if in the schistose near the dikes. In some cases, although not so commonly, they may also occur at some distance from a dike.

These gold-bearing rocks form a different belt, extending in a general way from the lower rampart of the Yukon and below to Dease lake and other mining districts in British territory, a distance in a straight line of about 1000 miles. Of this distance, 400 or 500 miles is in American territory. The width of the belt varies chiefly with the minor folding, which has accompanied the greater plications. In this belt in only the gold-bearing veins but the richest placers are found. This is naturally the case, since the gold in these placers is worn out of the solid rocks. It is especially true that the rich gulch gravels are in this belt, and also the most paying bar gravels, although often gold in some cases may be carried somewhat outside of the belt, and may be sufficiently concentrated in favorable situations to pay for washing.

The Birch creek and Forty-Mile and the Klondike districts are all in this belt, and are all in the schistose rocks, and in these rocks new deposits of value may be looked for. Some placer diggings of value may also be found in the rocks of the Rampart series; but, as a rule, higher horizons are probably barren, save in exceptional cases. Conglomerates made up of the detritus from the schistose Birch creek and Forty-Mile rocks should be prospected, however, since they may prove to be fossil placers. Ancient gravels lying above the present stream channels should also be kept in mind, for they may in places contain sufficient gold to be profitably mined.

The question as to whether a certain deposit, either placer or bedrock, contains enough gold or metals to render it profitable for working is one which can be solved by no universal rule. A deposit which, under certain circumstances, is extremely valuable may, under others, be entirely worthless. The circumstances which must be taken into consideration are: Cost of mining, ease of separating the metals from the ores, facility and transportation and numerous others. The question as to whether any deposit of any mining district in general will become profitable can be only partly solved by geology, for the rest depends upon other sciences. Labor in Alaska is worth $1 an hour, or $10 a day, and this gives a fair idea of the average cost of production of placer gold, which is two or three times that in the more accessible countries. In this region, therefore, a placer deposit, in order to repay working, must at present be three or four times as profitable as a deposit in most other places. In bedrock mines the expenses would be proportionately much greater, since more expensive equipments, machinery, etc., must be provided for the production and probable facilities for transportation of the ore for long distances. Under existing conditions, therefore, the probability of bedrock mines sufficiently rich to repay working is not great.

Were these conditions greatly improved, however, paying mines in the bedrock might be found, and could be worked in spite of the severe climatic conditions. The production at present is entirely from placer deposits, which are profitable in the face of the great disadvantages, and, with better conditions, a vast amount of auriferous gravel now useless would become valuable. The mineral resources must remain for an indefinite period comparatively useless, unless some means be taken for speedier and cheaper communication between the gold region and the outside world. As the country itself produces hardly enough food to support life, all provisions are now imported, the usual route being by sea to the mouth of the Yukon, and thence by the river to the mining district—a distance of over 4000 miles. This makes supplies so expensive that, unless better transportation is provided, the country will probably be abandoned as soon as the richest placer workings have been exhausted.

(To be Continued.)

*Condensed from advance sheets of "Geology of the Yukon Gold Dist. of Alaska," by Josiah Edward Spurr, of the U. S. Geo. Survey.

Two Large Idaho Canyons.

At a meeting on December 22, 1897, Waldemar Lindgren, of the United States Geological Survey, read a paper on "The Canyons of the Salmon and Snake Rivers, Idaho." The little known region between Idaho and Oregon, where the Snake river and its mighty tributary, the Salmon, join is one of exceptional interest. In this vicinity lies the eastern margin of the great Columbia lava-fields, the shore line, so to speak, where the molten flows were arrested by the mountain ranges of Idaho. Near Weiser, Snake river leaves the broad open valley occupying such a large part of southern Idaho, turns northward and flows across the great lava masses in a canyon which, Mr. Lindgren personally assures the editor of the MINING AND SCIENTIFIC PRESS, in grandeur is only second to the canyon of the Colorado. It is an abrupt trench cut to a depth of over 5000 feet in the basaltic plateau. The deepest and most impressive part lies in the vicinity of the Seven Devils, a group of peaks rising to elevations exceeding 9000 feet on the eastern side of the river. From the summits of these there is a sharp and continuous slope of 8000 feet down to the level of the river. The exposures along the canyons show from 1000 to 4000 feet of horizontal lavas, covering a series of older slates and greenstones.

The Salmon river canyon, for a long distance above its junction with the Snake, is between 4000 and 5000 feet deep. Except in its lower portion, it is cut in the rocks of the older series. Granitic rocks, forming a large part of the great Idaho granite area, occupy a large space in Idaho adjacent to the Columbia lava. Instead of being of Archean age, as has been hitherto supposed, the granite is probably post-Carboniferous, as shown by the contact metamorphism of the Paleozonic series adjoining on the north.

This series of slates, limestone, schist and greenstones, says Science, present the greatest similarity to the Auriferous slates of the Sierra Nevada. Round Crinoid stems were found in one of the limestone lenses. Excellent exposures are found in the lower Salmon river canyon and along the Snake river. The Columbia lava flows are of Miocene age. They consist nearly exclusively of massive basalt, and are piled up one on another in seemingly endless succession. Slight differences of structure make the individual flows conspicuous, and from a distance the exposures along the canyon side appear like those of a sedimentary series. The lava flows were poured out over an exceedingly uneven surface of deep valleys and precipitous mountain ranges. The latter tower far above the summit of the lava plateau, while the bottom of the former lies below the level of the river. Coupling this evidence with the fact that the sediments in the lower Snake river valley, above Weiser, are of great depth, their bottom probably not being far from sea level, it appears that this whole area has suffered a depression since pre-volcanic times. The great outpouring of the Columbia lava evidently dammed a gap between the two high pre-volcanic ranges, the Blue mountains of Oregon on the west and the Salmon river ranges on the east. This barrier produced a great lake, the Miocene and Pliocene sediments of which now fill the upper Snake river valley. The inland sea overflowed its barrier, established an outlet, and the mighty volume of water has worn a canyon, which eventually drained the lake.

A COLORADO SPRINGS, COLO., man writes that "the cost of producing one dollar, coinage value, in silver from some of our great silver mines of Colorado has been so often given at from 35 to 50 cents that I give the following as the actual cost in most cases and, in other cases, the closely approximated cost of producing one dollar, coinage value, in gold from a number of our great gold mines: Since the 1st of January, the cost of producing one dollar in gold from the Independence mine is 4 cents; the Victor mine for the past two years, 29½ cents; the Portland mine for nine months, including heavy development work and new machinery, 30 cents; the Bogart mine for the month of March, when they first encountered ore, 5 cents; the Isabella mine, for the year 1894, including the expense of labor troubles, doing development work and new machinery, 31½ cents. The cost of producing gold in the Union, Elkton, Moose, American Eagles, Little Johnnie, Tom Boy and a number of other mines of the State will average about with those above given. Gold is produced from our large gold mines at much less cost on the dollar than silver from any silver mine ever opened in Colorado."

The Stamp Milling of Gold Ores in Its Relation to Cyaniding.*

E. H. JOHNSON.

The President, in his inaugural address, comparing the two solvents, cyanide and chlorine, on closely concentrated ores, used the expression: "Given equal preparation of the material for the use of the solvent." The question of "preparation of material" could, I think, be given a wider field of application than merely to closely concentrated ores, and include the consideration of the present methods of preparation of tailings. The recovery of gold from tailings and slimes has assumed a position of sufficient importance at the present day to warrant consideration of their preparation at a stage prior to their collection. Beyond the various methods of collection and classification, the actual preparation of the tailings is outside the domain of the cyanide worker, and I hope I may therefore be forgiven in venturing outside that province to point out one or two details of common milling practice which militate against the successful treatment of tailings and slimes. I feel encouraged to do so since I find on inquiry that differences of opinion exist between experienced millmen themselves on these points.

It is usual, in referring to the degree of fineness to which an ore is crushed, to quote the mesh (in number of holes to the square inch) through which the material has been passed, and to overlook the important part played by the height of discharge, which is regulated by the "chuck block" of the mortar-box screen. Though, doubtless, you are all familiar with this device, it would, perhaps, be as well for me to define it. It may be described as a block of wood, covered on the mortar-box side with an amalgamated plate, fitting in the screen opening of the mortar-box below the screen frame, and varied in height according to the wear of the dies and the individual taste of the mill man. The deleterious influence of the "chuck block" on tailings preparation is in direct ratio to its height, and I find anything from 3 inches to 9 inches recommended by its advocates. Admitting for a moment its utility for the purposes of amalgamation—a much disputed point—surely the ores of the Main Reef series do not vary sufficiently in character to warrant this wide range in its application. The action of a high discharge is to cause the repeated return of ore particles beneath the stamps, although they were probably sufficiently reduced in size to have passed the screen could they have reached it. The screen-mesh, therefore, becomes no guide to a knowledge of the degree of fineness of pulp without acquaintance of the height of discharge. This is further complicated by the length of drop of the stamps and quantity of water fed into the mill, since by these means also facility of discharge can be accelerated or retarded. The result of a high discharge on the pulp is the reduction of a large proportion of the sand particles to a degree of fineness which is unleachable without excessive loss of sands in classification. Another disadvantage is that the pyritic portion, being the most friable, a large percentage of the fine pyrites passes into the tailings, since it is difficult to retain them in spitzlute concentration.

I made a series of sifting tests some time since of tailings produced by a mill crushing with a 900-mesh sieve and a 9-inch "chuck block." I found that 75 to 85 per cent of the tailings produced would pass through an 8100-mesh sieve. The result was the separation of an abnormal amount as slime and a most imperfectly leachable product of the remainder. So impermeable indeed was this material that vats containing 100 tons of sands absorbed thirty tons of solution without allowing any to pass the filter. The only means of draining these vats was by boring holes with a long rod through the sands, and so forming channels—hardly a desirable form of leaching, you will admit. The ideal physical condition of tailings for treatment is perfect accessibility of every particle, with the crushing carried sufficiently far to expose the gold to the solvent, and a minimum reduced beyond that point. The nature of the rock here, where the gold is principally carried in the more friable portion—the matrix of the pebble—renders the use of high discharge still more disadvantageous. The tendency of unevenly crushed material is to form compact masses of mixed tailings and slimes, which not only resist treatment, but become rich by the absorption of gold-bearing solution. These lumps may be noticed forming a fringe round the edge of dumps and round the conical heaps formed during the filling of a leaching vat.

I have touched upon the influence of the "chuck block" only in its relation to the production of tailings. It would be interesting, metallurgically, if one of our representative millmen would explain its action and advantages, or otherwise, from the amalgamation standpoint. With the high stamp duty required of millmen on these fields (something like double the quantity per stamp as is the case anywhere else in the world), any retarding of the discharge of the crushed material beyond the desired mesh of sieve seems to me to be anything but a desideratum.

Another common milling practice is that of taking the heated water from the condenser of the engine for milling purposes. In this connection I would like to draw attention to the well-known report of Mr. Wm. Skey, analyst to the Geographical Survey of New Zealand, on the losses in gold amalgamation occurring in the Thames gold fields. You will pardon me quoting somewhat fully, as his remarks have taken an extended bearing from their applicability to cyaniding as well as amalgamation. He reports:

1. "The numerous samples of bright, clean looking gold, of all degrees of fineness, refused to amalgamate on any of their natural surfaces, though taken directly from the reef and untouched by hand.

2. "That on such surfaces sulphur was always present.

3. "That native gold, or gold in a pure state, readily absorbs sulphur from moist sulphuretted hydrogen or ammonium sulphide, and absorbs it directly when administered in boiling water.

4. "That surfaces so treated refused to amalgamate, though no apparent change could be observed in their aspect.

5. "That gold so affected is rendered amalgamable by roasting in an open fire, unless copper is present to the extent of 7 per cent, or perhaps less, while the same effect is produced by contact with potassium cyanide, chromic or nitric acid, and calcium chloride acidified.

6. "That this absorption is altogether of a chemical nature.

7. "That sulphate of iron in presence of air and water decomposes various metallic sulphides common to auriferous ores in such a manner as to liberate sulphuretted hydrogen."

The point I wish to emphasize is that the absorption of sulphur from sulphuretted hydrogen by native gold occurred *immediately* when administered in boiling water. Ferrous sulphate is present to some extent in all our mine water, and, consequently, in the water used in milling. The conditions necessary for the decomposition of the metallic sulphides and consequent evolution of sulphuretted hydrogen are therefore present. It is fair to assume that the rapidity of this decomposition is in ratio to the temperature of the water, as indicated by Mr. Caldecott in his paper on the "Treatment of Accumulated Slimes," read at the July meeting of this Society. Mr. Skey has pointed out the injurious action upon the free gold, and we have to consider the injurious action of this decomposition in providing us with those oxygen absorbents and cyanicides which impair results in subsequent treatment of tailings and slimes. Nature has been already sufficiently generous with respect to these ferrous compounds without our adding to the supply by a system that is advantageous to no department of gold recovery.

There are two chemical conditions of the ore in which the cyanide treatment progresses satisfactorily: (1st) The condition before any decomposition of the metallic sulphides has taken place; (2d) When complete decomposition has been obtained, or, in other words, when the ore has satisfied its absorbent capacity for oxygen. No better example of this could be given than the experiment made by the President and quoted by him at the August meeting of this Society. It was in reply to a question respecting the effect of partial roasting. He said: "We made a careful series of determinations by partial roasting. We started on top and took our samples right down through the furnace, and the moment the heat commenced to act we got extractions which decreased all the way down until the ore was dead roasted, when the extraction went up." As roasting would only be available in the treatment of rich and heavily sulphuretted material, it behooves us to endeavor to obtain as near as possible the first condition named, and to avoid anything in the preparation of the ore which advances the decomposition of metallic sulphides. The initial stages of decomposition having been set up, the rest becomes cumulative from the further reaction of the products of decomposition, and as each reaction requires a further supply of oxygen, there is a constant withdrawal of available oxygen required for successful treatment.

Having endeavored to deal with these two milling practices from the point of view of their influence on cyanide work, it would be interesting to hear if in amalgamation there are compensating economic advantages to justify their undoubted deleterious influence on cyanide work. It is with no desire to trespass within the province of the mill manager that I have brought forward these few remarks, but, if possible, to draw attention to the double function of the mill in its capacity as an amalgamating machine and its equally important service in the "preparation of material for the use of the solvent."

*Chemical and Metallurgical Society of South Africa.

Origin of Amber.

The main source of the amber supply is the sea coast of the Baltic sea. It is fossil gum, originally the exudation of a species of conifer now extinct. This grew in luxuriant profusion hundreds of thousands of years ago on the marshy coasts of northern Europe, when the climate was much warmer than it is to-day. The natural history of amber is thus explained: The immense forests of amber pine underwent their natural downfall and decay. The resin of the wood accumulated in large quantities in bogs and ponds and in the soil of the forest. Where the coast was slowly sinking, the sea by and by covered the land; and the amber, which had been gradually hardening, was at last deposited at the ocean bottom. But in higher regions the pines continued to flourish, and so amber would still continue to be washed down to the shore and deposited in the later-formed green sand and the still later formed stratum of lignite or brown coal. The gum became fossilized by its long burial underground.

More than 200 specimens of extinct life, animal and vegetable, have been found imbedded in amber specimens, including insects, reptiles, plants, leaves, shells, fruit, etc., which had been caught in the liquid gum and entombed there for all time. Some of these specimens are so curiously beautiful as to be almost priceless, and one English collector has a cabinet of them which is valued at £100,000. One piece embalms a lizard about eight inches long, a little jewelled monster perfect in its form and coloring, which has no like in anything existing now. Indeed, in many instances, science is able solely through this medium to study details of animal life which perished from the earth many hundred thousands of years ago. There are flies preserved with wings poised as if for flight, where the prismatic sheen glowing through the yellow sepulchre is as brilliant as if they were floating alive in the sunshine.

Natural Gas Wells in the United States.

The wells usually are started with an 8-inch hole, which is fitted with wrought iron pipe, through the drift to the bedrock. Through the succeeding strata a 5⅝-inch hole is drilled and fitted with a wrought iron casing down to the solid, impervious stratum located just above the gas-bearing rock, through which the drill is run without any casing into the gas rock. Upon the developments at this point depend the next steps. A mixture of oil and salt water may be encountered with the gas, and many ingenious experiments are adopted to separate them.

The gas is brought to the surface through 2½ or 3-inch wrought iron pipe, at the bottom of which is placed an arrangement of so-called "packers" to make a gas and water-tight joint between the pipe and the solid, impervious rock wall of the drill hole, and if water and oil are found in the gas rock, to keep them from flowing up from the lower end of the pipe. The general style of the many types of packers is the same. A hollow cylinder of rubber, smooth or ribbed on the outside, and as large as can be put in the well, is held above and below by a ship joint. When the tubing rests on the bottom of the well, the weight of its upper part forces the top flange upon the rubber, distending it against the sides of the well, and thus making a gas and water-tight joint.

At the surface end of the tubing three valves are placed and arranged so that the well may be blown out into the air, or shut off from the service main, which is also blown out from time to time. Before confining the gas by closing these valves, the tubing is anchored down by clamps and ties to the top of the 8-inch casing. In spite of every precaution, attempts to control the gas are often followed, where great pressures are encountered, by the lifting of the tubing casing and all from the ground. Instances are recorded of wells remaining uncontrolled for over a year.

The depth of the wells varies greatly in the different fields, the widest variations being in the Ohio and Pennsylvania districts, while in Indiana it is more uniform. The best wells in Indiana are about 1000 feet deep, and, as a rule, tap the Trenton limestone less than 100 feet either way from sea level. In Pennsylvania and Ohio wells are much deeper below sea level. A geological section of Indiana rocks along a line from Delta, Ohio, to Terre Haute, Ind., passes through the most productive region.—Hosea Webster, in Cassier's Magazine for February.

AN improved process in steel casting, applicable to large or small guns, engine cranks, railway wheels, propeller shafts, etc., is described at length in a contemporary. The design of the inventor is to meet or prevent those hidden flaws in steel which so often produce bursting and fracture. The plan is to make the castings in an airtight chamber from which all air is exhausted, the mould or casting being placed in the chamber before the exhaustion of the air. This chamber is surrounded by a series of other chambers, each connected with the central chamber by a pipe controlled by valves, and in these chambers a reserve vacuum is stored, the air from them being exhausted by vacuum pumps. When a casting is ready to be run in, the controlling valves are opened and the residue of air in the casting chamber is instantaneously sucked out into the surrounding chambers at the same moment that the molten steel is poured into the mould. The casting thus takes place in vacuo—that is, the secluded air and gases rush out of the fluid metal and diffuse themselves in the vacuum chambers, and a flawless, homogeneous steel casting is the result.

New Explosives in Mining.

Inventors have been busy lately in an effort to discover a safer and cheaper explosive than gunpowder for the blasting of coal. Some interesting experiments were recently carried out at Southport to determine the relative strength and efficacy of a new explosive. The conditions of the test in each case were the same, ten grammes of the explosive being used. This was placed in steel mortar loaded with a projectile weighing thirty-five pounds. All shots were fired at an angle of 35°, with the following result: Gunpowder threw the projectile 31 yards; kynite, 88½ yards; benedite, as the new powder is called, 155 yards, and dynamite, 161½ yards. Benedite contains no nitro-glycerine, and it was also subjected to severe tests as regards handling. Unlike dynamite and explosives generally, benedite could not be exploded by either a blow from a hammer or direct application of flame. It can only be exploded by means of a detonator. For safety blasting coal in mines a series of trials have shown that when it is exploded in the presence of highly inflammable mixtures of pit gas and coal dust it would not ignite them. It is further claimed for the new explosive that its cost of production is much below that of powerful explosives generally, and it is to be put on the market at a considerably lower price.

In the early days of dynamite the mischievous and often fatal doctrine was thoughtlessly promulgated that, under the influence of fire, that explosive would only burn, and that nothing would cause it to explode except the application of a proper detonator. Notwithstanding the efforts made to cause the public to unlearn this foolish doctrine, it still lingers. The doctrine preached by those who know anything about the matter is that explosives are only comparatively safe at the best, and then only so long as they are treated as absolutely dangerous. There is no reliance whatever to be placed on the theory that dynamite and many of its congeners can be burned without exploding. This has been illustrated over and over again with fatal results. Were the author of a highly flavored story to introduce into his plot the instantaneous death of a newly married couple by an explosion of dynamite in the stove of their sitting-room, the explosion being brought about by the bridegroom's brother baking the dynamite in the oven, the author would probably be accused of going beyond the bounds of probability after the sensational, and yet this combination of circumstances did actually occur in a mining district in England. The ingenuity exercised in devising means for thawing dynamite in the most unsafe way possible is certainly very remarkable. This thawing-out process is the most fruitful cause of accidents with dynamite. The dynamite becomes inert at about 40° F.; and, while this is a very valuable property for transportation purposes, it plainly also has its disadvantages.

On page 82 of the issue of the 22nd ult. appeared an article on the care and management of belting, which originally appeared in the *Scientific Machinist* of Cleveland, O., on Jan. 1st, and to which excellent journal credit (which was inadvertently omitted) should have been given.

Dr. C. G. Baldwin of Claremont, Cal., has organized a stock company with a capital of $250,000 to develop electric power at Mill creek, about twenty miles east of San Bernardino.

Recently Declared Mining Dividends.

Jamison M. Co., Cal., 5 cents per share, $19,500; Feb. 15.

Mammoth M. Co., Utah, 5 cents per share, $2000; Feb 2.

Geyser-Marion Co., Utah, 3 cents per share, $9000; Feb. 1.

Ruth mine, Sandon, B. C., $75,000; Feb. 20.

Whitewater mine, Slocan, B. C., $30,000; Feb. 1; total to date, $154,000.

Swansea M. Co., Utah, 5 cents per share, $5000; Feb. 10.

Coast Industrial Notes.

—During '97 about 26,000,000, gallons of wine were produced in California, at an average price of 9 cents per gallon.

—The graders of the Valley Road are at Bakersfield, Cal. The road will begin to operate there by March 1st.

—H. De Laguna has made an offer to the Los Angeles, Cal., city council to construct and equip a complete water plant for the sum of $1,875,000.

—California expects to produce 160,000 tons of beet sugar this season. One-half of this will be consumed in the State, leaving 75,000 tons, or 6250 carloads, to be shipped East.

—L. Terrazas and associates have been granted a concession for the establishment of one or more packing houses in the republic of Mexico. They must invest $1,000,000 in the plant, and have deposited $10,000 as a guarantee.

—The Sonora, Cal., *Democrat* says that the Stockton and Tuolumne Railroad will positively be built, that it knows one person who has put up $100,000 in cash, taking therefor stock in the Stockton and Tuolumne Railroad, and stands ready to put up a like amount at a few days' notice.

—Orange shipments from southern California are now under full headway. During the season they range from 40 to 120 carloads daily over the Southern Pacific, and at present the line is carrying toward the East ninety carloads every twenty-four hours. Three hundred boxes go to the car, containing each on the average 200 oranges. This would make the present shipments of that fruit over that line 5,400,000 daily.

—The Port Susan Logging Co. has just completed a contract for what is reported to be the largest cargo of spar timbers ever put out of Puget Sound. The cargo consists of 640 spars, running from 50 to 116 feet in length, and varying from 72 inches in diameter at the base to an 18-inch diameter at the top. The spars go to Boston. The logs are squared at the butt end and for one-half of the whole length, making the square of the butt equal to the diameter of the log at the one-half mark.

—A contract for the construction of the railroad tunnel, near Point Richmond, Cal., was awarded this week by the Board of Directors of the San Joaquin Valley Railroad to Foley Bros. & Muir of St. Paul, Minn., conditionally. The reason for the proviso was that no representative of the successful bidders was present to enter into a definite agreement, one of the terms of which is the filing of a bond in $100,000 for the proper execution of the work. The amount of the contract is stated by the railway officials to approximate $350,000. The construction of this tunnel is in effect the starting point of the direct connection of the Valley Railway with San Francisco. It is to permit the passage of trains from Stockton to Point Richmond, on San Francisco bay, through a range of hign hills laying between the tule lands and the promontory. The tunnel proper will be 5700 feet in length.

—Regarding the Nicaragua canal, the Maritime Canal Company, anticipating a favorable report from the Walker commission as to the feasibility of the project and of subsequent favorable action by Congress, has men on the ground prepared to begin the work of construction. Under terms of its concession from the Nicaraguan government, the canal was to have been completed next fall, otherwise the concession would be forfeited unless the company had expended a large sum of money. In fact, it is the contention of the Nicaraguan government that the concession has already been forfeited, but this contention is not accepted by either the company or the administration. The preliminary report which the commission will make will be submitted to Congress with a view to getting favorable action upon the bill. It has been anticipated that the report would be favorable, both as regards the feasibility and cost of the canal. The estimate made by Civil Engineer A. G. Menocal for the company in 1895 for the construction of a canal following the Tola basin line puts the coast of work at $66,466,880, and a second estimate, the canal to follow a low level line, fixed the cost at $68,893,660. The Ludlow commission estimated that a canal built along the low level line would cost $133,472,893. If the Walker commission estimated that the cost will be three-fourths of Mr. Menocal's original estimate $66,466,880, then it fixes the figures at $49,855,160.

Commercial Paragraphs.

The Colorado Iron Works Co. have just shipped two carloads of machinery for the new roasters the Germania Lead Works of Salt Lake City, Utah, are putting in. This shipment will be followed with eight carloads more before the entire amount ordered is shipped. The Bruckner cylinders now being built by the Colorado Iron Works Co. for the above company are 8 feet 6 inches diameter by 37 feet long, and these will be shipped as soon as completed. The number of cylinders being built is five. The Colorado Iron Works Co. have also made shipment of two carloads of machinery to Old Mexico, one carload being concentrating machinery for the San Vincent M. Co., at Ameca, and the other carload constituted settling bowls for the Great National Mexican Smelting Co. at Monterey.

The General Electric Co. has received orders from the British Thomson-Houston Co., Ltd., covering the complete locomotives for the Central London Underground railway. The original contract between the two latter companies included, with the special gearless motors and other electrical equipment, thirty-two locomotives for this important underground system, but these it was supposed would have been built in England. The decision to confide the construction of the locomotive cabs and trucks, as well as the electrical equipment, to the General Electric Co., is dictated by the desire to have the locomotives built complete under the same supervision. The locomotives will each weigh about forty-five tons, and will be equipped with a total of 800 H. P. in motors. The trains to be hauled will be made up of five cars, giving a total load of 150 tons, ten tons heavier than the ordinary Manhattan Elevated train. The schedule speed will be 15 miles an hour. The diameter of the tunnel being 11 feet 6 inches only, motor cars could not be used. The entire electrical equipment will, therefore be placed on locomotives, which will probably resemble in appearance those in use on the Manufacturer's railroad in New Haven, Conn., and on the Hoboken Shore road, Hoboken, N. J. The General Electric Co. is building thirty-eight additional 175 H. P. motors for the Metropolitan West Side electric elevated road.

The No. 8 Gates rock and ore breaker may well claim the distinction of being the largest rock crusher ever made, and it probably marks the highest limit attainable in a practical way. A recent report from one of these machines gives a record that will doubtless stand long at the front. The Pittsburg Limestone Co., Ltd., of New Castle, Pa., reports officially as having in fourteen months crushed 23,174 cars averaging 24 gross tons each. The working day was ten hours. This gives an average hourly product of over 180 tons for fourteen months. Some of the large daily outputs seem almost incredible. On June 21, '97, this machine crushed 4,350,000 pounds of rock, or 2175 tons. This means a freight train of nearly 100 cars.

Books Received.

"*The Proceedings of the Chemical and Metallurgical Society of South Africa*," Volume I, May, 1894-January, 1897, being the best utterances of the leading miners and metallurgists in Johannesburg on the cyanide and other up-to-date gold mining processes. Nearly the entire contents of this book of 350 pages have already appeared in the columns of the Mining and Scientific Press from advance sheets, which is the best evidence of the high opinion this paper has entertained of its value. The book is issued in admirable style by R. W. Hunter of Edinburgh, Scotland.

"*A Manual of Hydraulic Mining for the Use of the Practical Miner*," by T. F. Van Wagenen, second edition, 95 pages, 12mo.; a handy little volume, not pretentious, but of use to practical miners. The author in his introduction says that hydraulic mining is "simply a question of moving gravel or soil from one place to another," which is somewhat superficial in its idea—hydraulic mining being a great deal more than that. Our drift and gravel gold miners in this State will hardly agree with the author where he says, a little further on, speaking of gold in gravel deposits, that "the chemical and mechanical operations required to separate it from its vein substances, with which it was originally associated, have already been performed by nature." The book is sold by D. Van Nostrand & Co., 23 Murray street, New York City. Price $1.

"*Placer Mining; a Hand Book for Klondike and Other Miners and Prospectors*," 146 pages, 8vo., giving routes to the Yukon, practical suggestions as to outfits required, mining regulations of Canada, some pointers as to camping and traveling, with incidental geology as to the origin of gold placers, and some remarks on the origin and development of placer mining, with illustrations drawn from California hydraulic practice. Published by the Colliery Engineer Co., Scranton, Pa. Price $1.

"*A Practical Hand Book for the Working Miner, Prospector and Mine Investor*," by John A. Miller, 228 pages, 8vo., containing considerable general information, but not of the kind of any great practical benefit to the Pacific coast miner. It would be impossible to write a book on the subject that would not be of some value to some one, and doubtless there are many miners who would find this book of considerable value. In general, its fault is that it is not specific. It treats of its topics in a general way and attempts to cover too much. Essays on such questions as "Is Mining More Dangerous to Life, Limb and Health Than Other Trades?" and diatribes on the folly of too much credence in the assertions of mining prospectuses, together with chapters on how a board of directors of a mining company are to run their business, with incidental discussions of mine managers, booms and necessary legislation, are not what the average Pacific coast prospector is looking for. The book is published by Spon & Chamberlain, 12 Cortlandt street, New York. Price $3.

Recent California Mining Incorporations.

Table Mountain M. Co., Fresno; capital stock, $100,000; subscribed, $10,000; C. S. Peirce, F. H. Short, M. Lauer, J. Q. Anderson, C. A. Knepper.

How Duck M. Co., San Francisco; capital stock, $15,000; subscribed, $5500; Hoo Sue, Hoo Lee, Hoo Sam, Hoo Ping, Hoo Wai.

Gold Nugget M. Co., Colfax; capital stock, $10,000; subscribed, $1000; A. G. Bell, G. W. Lewis, R. Gay, E. F. Sailor, W. L. Baker.

The Santa Theresa and San Juan M. Cos., San Francisco; each company has a capital stock of $100,000, of which $81,000 has been subscribed; W. G. Leale, L. H. Turner, R. M. Murray, W. E. Elliot, F. H. Stearns.

Personal.

Chas. D. Lane is in Mexico.

Geo. McAulay is now Supt. Mayflower mine, near Forest Hill, Cal.

D. L. Coles of the Montauk mine, Newcastle, Cal., has gone to New York.

J. S. Muir of Glasgow, Scotland, is examining mining property in Deadwood, S. D.

Dr. N. S. Keith, a pioneer electrician, has returned from a five years' residence in London.

Eugene Del Mar is in San Bernardino, Cal., buying mining property near Holcomb valley for English investors.

Mr. A. P. Brayton, Sr., Pres't Pelton Water Wheel Co., is back from a sojourn in Hawaii, much improved in health.

C. S. Warren of Spokane, Wash., is understood to be slated for the position of manager of the British America corporation.

N. Tregear, who was foreman under the late Capt. Hall, succeeds that gentleman as superintendent of the Le Roi mine, B. C.

F. E. Shepard, formerly consulting engineer for the Denver Engineering Works Co., has succeeded Mr. Croll as superintendent of the works.

D. J. McDonald, recently appointed inspector of metalliferous mines for the province of British Columbia, has entered upon his duties at Rossland.

T. L. Canvin succeeds Stephen Moyle in the superintendency of the Potazuba mine, Sutter Creek, Cal. Mr. M. is the new foreman of the Gwin mine.

Capt. Thos. Mein returned from Mexico this week in company with Wm. Chalmers, of the firm of Fraser & Chalmers, and Col. Perkins, of Goodall, Perkins & Co.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JANUARY 25, 1898.

597,960.—Miner's Lantern—Harriet J. Delzele, Jackson, Cal.

597,904.—Transporting and Weighing Cane—A. S. Hallidie, S. F.

598,067.—Car Fender—W. B. Heywood, Gualala, Cal.

598,068.—Car Fender—W. B. & W. H. Heywood, Gualala, Cal.

597,991.—Swing—G. M. Lease, Salem, Or.

597,734.—Hay Loading Net—C. McConnell, McDermitt, Nev.

598,004.—Pitman for Mowers—J. S. Ord, Aptos, Cal.

597,832.—Wave Power—J. M. Palmer, Fort Grant, A. T.

597,833.—Wave Power—J. M. Palmer, Fort Grant, A. T.

597,788.—Photo Carrier—M. V. Shaff, Los Angeles, Cal.

598,025.—Gas Engine—S. S. Simrak, S. F.

597,920.—Refining Oils—E. A. Starke, San Rafael, Cal.

Note.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Device for Transporting and Weighing Cane.—A. S. Hallidie, San Francisco, Cal. No. 597,904. Dated January 25, 1898. This invention relates to a method of transportation by means of elevated wire ropes elevated above the ground, moving on sheaves or pulleys, and usually called ropeways, and automatically depositing and weighing the discharged product. This invention is especially designed for the rapid and economical transportation of sugar cane and other products grown from fields where they are gathered to a distant point where it may be desired to collect them. This is accomplished by means of an endless traveling rope suspended above and across the field occupied by the growing crop, a carrier suspended to clips or saddles upon said rope, one or more hangers depending from the clips, each having an eye at the upper end to connect it with the clip, and a pawl and socket connection at the lower end for the suspension of the carrier. The carrier has jointed arms connecting to the hangers, a counterbalance lever, a latch or keeper to hold the cradle sections in position and diagonal braces to prevent longitudinal swinging of the hangers. At the point of deposit is a tripping piece which acts to automatically disengage the latches and allow the cradles to tilt and discharge their contents upon the weighing platform. This weighing platform carries upon it a receiving surface having an upwardly projecting guard upon one edge, this surface or platform normally standing in a horizontal position, so that the contents of the carrier are discharged upon the platform, where it remains long enough to be weighed, after which the platform is tilted to deliver its contents to a chute or other means for conveying it to the feeding belt of the sugar mill or to any point where it is to be deposited.

It is worthy the attention of those engaged in the manufacture of cane sugar.

TEN WEEKS FOR TEN CENTS!

Strange as it may seem, that big family paper, the *Illustrated Weekly Sentinel*, of Denver, Colorado, (founded 1890) will be sent ten weeks on trial for 10c.; clubs of six, 50c.; 12 for $1. Special offer solely to introduce the paper. Gold rings set with Rocky mountain gems are given free as premiums. Latest mining news and illustrations of grand scenery each week, also true stories of love and adventure Address as above and mention Press. Write today; postage stamps taken.

Mining Summary.

CALIFORNIA.

Amador.

The Argonaut mine's reservoir at Jackson, for mill power, is completed. It will hold 8,000,000 gallons of water.

Mining operations at Oleta have been suspended for lack of water.

The shaft at the Argonaut mine is now 1710 feet deep. Work in the mine at present is confined to and above the 1200-foot level; ore enough is taken from the upper levels to keep the forty stamps dropping steadily night and day.

The South Eureka plant at Jackson is run by electricity. This is the first plant in Amador county run by electricity.

The new hoist at the Amador gold mine will be operated by a 6-foot water wheel driven by a stream having a fall of over 300 feet.

The Keystone is crushing about 5000 tons of ore a month. The South Spring Hill is about ready to start up. The 80-stamp mill of the Wildman-Mahoney runs steadily. At the Wildman the sinking of a perpendicular three-compartment shaft has been commenced 800 feet east of their old shaft. This shaft is expected to strike the ledge at a depth of 2300 feet. The Balliol 40-stamp mill is running steadily on paying ore. In the Kennedy they are drifting for the ledge on the 2150-foot level. After spending nearly $125,000 on the Alma within the past four years, the promoters have shut down. The Zeila 40-stamp mill is running without interruption. The 30-stamp mill of the Union Con. will start up when there is a sufficient supply of water, as there is plenty of ore blocked out.

A contract for sinking the South Eureka shaft at Jackson 200 feet deeper has been let to Crocker & Wells of Jackson, the price per foot being $14.95. The present depth of the shaft is 1300 feet.

Calaveras.

At Douglas Flat the Lone Star Co. has over 200 carloads gravel in their dumping box. The Ohio Co. have over 1000 carloads of gravel in their dump box. The old Dashaway (now called Holliday) mine is to be reopened.

The Pine Log mine at Copperopolis is giving good returns.

All mining at Murphys has been temporarily suspended owing to cold weather and lack of water.

The Spanish Bar G. M. Co. has incorporated—capital stock, $50,000; J. Hay, H. G. Grauerholz, J. Daisley, J. Klein of San Francisco, W. T. Robinson—to mine on the Mokelumne river, three miles from Mokelumne Hill, a gravel deposit to be worked by hydraulic elevator.

El Dorado.

(Special Correspondence).—At Nashville the old Montezuma is again among the producing mines. C. J. Heald, the owner, has put several men at work and the mill is grinding on $10 ore.

The Gearhart, 20-stamp mill, is idle, awaiting development work.

At the German sinking continues with satisfactory results. After years of idleness and later vicissitudes by various parties endeavoring to reopen the property, the present owners are meeting with success by their systematic work in seeking depth.

The Union, situated between the old Springfield and Church-Union, is proving a surprise in its rich ore. The average yield is $40 per ton. There are twenty stamps in operation. The property is owned by Judge Williams and A. Harpending.

At the Omo mine, owned by F. S. Jones & Co., the 5-stamp mill is running on $10 ore.

The Big Sandy is taking out rich ore near the surface. The greatest depth reached is 330 feet. The company is preparing to sink deeper. The property is owned by Toledo people.

At the Ohio they are drifting on the 300 level. The results of this work will determine future operations of the company on this property.

The Pocahontas is being experted by W. R. Chadbourne of Leadville for the St. Louis owners. I am reliably told that upon his verdict depends whether or not the company will continue operations.

The Griffith, Larkin and Boulder are showing successfully that deep mining is essential to making good mines on the mother lode in this county.

N. Fossatti has begun development on a gravel property of large acreage at Smith's Flat.

On the Cleveland the shaft has reached 264 feet. The ledge is in 8 feet on low-grade ore.

Placerville, Jan. 31st, '98.

(Special Correspondence.)—The Newton Drift mine is ready to start its ten stamps as soon as water is available.

At the Montauk work progresses satisfactorily to the new purchasers, who seem elated over their acquisition. They are considering the immediate addition of twenty stamps.

Placerville, Feb. 1st, '98.

Work is to be resumed in the Lucky Marion mine at Greenwood.

The mill on the old Zentgraff mine, near Rattlesnake Bar, is to moved to the new Zentgraff mine on Sweetwater creek, near Green Valley.

The Esperanza 10-stamp mill at Garden Valley is completed and in running order.

Kern.

A Johannesburg correspondent writes: The King Solomon mine is turning out $1000 ore at a depth of 315 feet, and from the William J. Bryan mine a strike is reported of still richer ore. From the Nancy Hanks (of the Rand) fifty tons will be sent to the reduction works as an experiment.

The Butte M. Co., which has had an option on the Butte mine at Randsburg, has deposited $50,000 in the Bank of Tehachapi, which will go to the original owners as soon as their title is clearly shown. It is stated that they have struck a newly discovered ledge varying in width from 4 to 25 feet and running about $40 to the ton.

Randsburg *Miner*: Arrangements are about completed for the erection of the first stamp mill in Randsburg, to be erected on the Kinyon mine.

The Yellow Aster mine, Randsburg, is producing over seventy-five tons a day of about $30 gold ore.

Madera.

(Special Correspondence).—The incline on the footwall at the Magnet mine, near Central Station, has reached a depth of 50 feet, showing satisfactory. A stratum of ribbon-quartz, occupying a space of 12 to 18 inches next to the clay gouge of the footwall, runs $6 to $8 in free gold and carries 5 per cent of high grade sulphurets.

The owners of the Lily mine, near O'Neal's, will shortly add additional stamps to their mill and will establish a pumping plant on Fine Gold creek.

Gold, Jan. 31st, '98.

Mariposa.

Brown & Turner, representing the Con. M. Co. of San Francisco, were at Bear Valley last week, examining the Los Minos mine.

Nevada.

The You Bet hydraulic mine, which has been idle for ten years, will start up again in two or three weeks and give employment to twenty-five white men.

Nevada City *Transcript*: Chapman Ranch M. Co.'s new 5-stamp mill is run by electricity.

Orange.

The crushing plant at the Dunlap mine, in Silverado canyon, is completed and will commence operations as soon as enough water will rise in the creek for operating power.

Placer.

Mr. Chappellet has word that at the Eureka Drift mine they are making fine progress in the tunnel. The steam drills were started up on Jan. 15, and in the following week 47 feet were driven, putting the tunnel in 105 feet beyond the upraise.

Colfax *Sentinel*: The Lost Emigrant quartz mine, on the North Fork of the American, is sixteen miles south of Soda Springs. The shaft sunk on the ledge is down 74 feet. A test of rock on the surface shows a value of $165.80. Ore from the bottom goes $173 to the ton. Tests of rocks taken at intervals for 2500 feet on the ledge assay from $5 to $160 per ton. A mill will be erected this season.

Auburn *Argus*: Considerable development work has recently been done on the Galena quartz mine, at Black canyon. The main tunnel has been extended on the ledge 410 feet. The ledge has an average width of 4 feet. Development work is being done on the Horsefly quartz mine, which is an extension of the Galena quartz mine in Black canyon. The prospect tunnel is now in 70 feet on the ledge and some fine-looking quartz has been taken out.

Tidings: The Liberty Hill and Polar Star hydraulic mines, the former in Placer Co., the latter in Nevada Co., near Lowell Hill, have completed raising their dam 10 feet, in accordance with a permit granted by the Debris Commissioners. The dam is built in Bear river, opposite Dutch Flat, is 60 feet high, and the mining companies have the privilege of building it 10 feet higher when necessary. This dam was made by hydraulicking the Polar Star mine, running the slickens down to a narrow point in the river and building the dam with the waste dirt thus washed down. The working of these mines is permitted by the Commissioners, and gives employment to forty or fifty men. The Polar Star is superintended by W. Maguire of Lowell Hill. At the Liberty Hill mine they are working on a good channel of gravel. On the day the mine was visited a powder drift 60 feet deep in the side of a mountain, with drifts running from the end of that drift 40 feet each way, was completed. Five hundred kegs of black powder will be placed in this drift and exploded, loosening the ground to facilitate hydraulicking. Two thousand five hundred inches of water, with a 500-foot pressure, is continually pouring out of a 6½-inch nozzle. Seven anti-debris men viewed the dam on Sunday. When asked their opinion, Mr. Phipps said the dam was fairly satisfactory, but its merits will be discussed at the next meeting of the Anti-Debris Commissioners in February. Mr. Phipps stated that his main opposition to this dam, if any, would be the choking up of the still way, or outlet for the river, allowing the dam to overflow and thus wash the debris down the river. As the permit has been granted, Mr. Phipps says that if the Commissioners decide to oppose the working of these mines, it will be done by suits to enjoin them from hydraulicking. The tenor of his conversation was to the effect that the dam was satisfactory to them. The dam at Greenhorn, Nevada Co., will be commended. There are thirteen permits granted by the Commissioners in Placer Co., and of these only three are working. This is due wholly to lack of water, caused by the absence of the usual heavy rains.

Plumas.

The drift in the Bushman mine near Quincy has cut into the channel containing large deposits of gold-bearing gravel. The *National-Bulletin* says it is so rich it will pay from $15 to $25 to the pick.

San Bernardino.

Numerous miners are at work with their dry washers at the foot of the Pinto mountains, all making good wages. This is a large district and nuggets are found frequently. Some of them contain from $26 to $37 gold. One man brought in $185 worth of gold, which was the result of two weeks' work. Another made $22.50 in one day, $65 were obtained by another party in one week, and $85 in ten days. As the ground is now moist from the snow which recently fell, only the coarser gold could be saved by the dry washer, and the finer gold is lost in the tailings.

Shasta.

The mines at Harrison gulch are being worked with full crews, both night and day. The cyanide plant is also run full time.

Sierra.

(Special Correspondence.)—The South Fork Co. has reached pay gravel after long and persistent work. They are at a disadvantage, however, lamenting with other sections of the country the failure of snow and rains. The South Fork is an extensive property, and many thousands have been expended to reach the channel, which has been finally accomplished. The same company is operating the North Fork and Lucky Dog properties. All are owned in San Francisco.

The Hope at Alleghany, a quartz mine, is still driving its tunnels.

Forest City, Jan. 30th, '98.

P. Doray has leased his Slate creek claims for '98 to a La Porte company for $5000.

Owing to the severe cold weather the men employed at the Mt. Vernon and Sierra mines are laid off.

Siskiyou.

The Aromas M. Co., on the North Fork of Salmon river, have thirty-five men constructing a 2½-mile ditch from South Russian creek The company will use hydraulic elevators and up-to-date machinery in the development of their property.

News: The mining company of Luttrell & Wharton has commenced operations in their quartz mine in White's gulch.

On Ash creek, near Hornbrook, pockets of gold have been taken out that aggregate in the neighborhood of $10,000 within the last two months.

The Salmon River M. Co. are building a 7-mile ditch and flume to work gravel near Sawyer's Bar.

M. B. Shepardson is replacing his arrastra with a 5-stamp mill at his mine, Harrison Gulch mountain.

Journal: A nugget was recently taken out of Major Myers' quartz ledge in Quartz valley containing about $150 worth of gold. Work is still carried on day and night at the Greenhorn Blue Gravel mine near Yreka, with very good success, the yield averaging from about $800 to $1300 a week. Thirty men have been employed during most of the time, until the past few days, when a few men were laid off, owing to scarcity of water by the freezing at night. On Humbug, the cold weather has made tunneling into the old Spencer mine uncomfortable work, and the same cause retards operations in the Hegler and Cartwright & Phillips quartz mines, lately bonded by companies of capitalists in California and Colorado.

Trinity.

The mill of the Trinity Con. M. Co., on Dog creek, has closed down owing to cold weather freezing the water.

Tuolumne.

In the Kanaka mine several tunnels have been run a distance of 300 to 600 feet. The ledge is from 1 to 6 feet wide. A 10-stamp mill is in operation.

In the Jumbo mine, near Summerville, which is bonded to Scott, Dowe & Co., a shaft has been sunk to a depth 50 feet and rock which averages $5 per ton in free gold and extremely rich in sulphurets, is being extracted therefrom.

The fifteen stamps of the Keltz mill, at Sonora, are dropping on ore that is reported as good.

Preparations are being made for extensive gravel mining near Montezuma. Modern appliances will be used.

Work on the new 10-stamp mill for the Sell mine will commence this week.

The Maryatt 20-stamp mill, at Tuttletown, has started up.

When the shaft in the Junction mine, at Black Oak, is down 150 feet, different levels will be opened up. The ore is black sulphurets.

In Poorman's Friend another ledge has been discovered 4 feet in width.

The 20-stamp mill of the Shawmut mine has been running steadily since Dec. 5th. The bottom of the shaft is 900 feet below the croppings.

Yuba.

The ten stamps of the Good Title M. Co.'s mill crush three and a half tons per stamp. The additional five stamps will soon be completed. The shaft is down 300 feet. Stoping is going on above the 100-foot level, where the ledge if from 4 to 5 feet in thickness and is in good milling ore.

NEVADA.

(Special Correspondence).—The mines at El Dorado canyon, Lincoln county, are owned by the Southwestern M. Co. of Philadelphia, Chas. Tracey, Supt. and Mgr. They are from six to nine miles west from the Colorado river. The mill, a 15-stamp, is on the river at El Dorado canyon. The ore is hauled from mines to mill with mule teams. Grain, hay, merchandise and all supplies are freighted from here seventy-five miles. The mill is run by steam power, drift wood from the river being used for fuel. Indians catch and deliver the wood at $4 per cord. Under the above difficulties, $6 to $8 ore pays expenses, and the mill has only been run twelve hours per day, not being able to transport enough ore from mines to mill to keep mill running twenty-four-hour shifts. When the present management took hold the mines were said to be worked out and worthless. They have developed large ore bodies, and these mines are very valuable, proving that low-grade ore can be worked at a profit even in this desert country.

It is of interest to note that twenty years ago there was no gold in that district—that is, no one looked for gold—and it was said that there were no gold ledges that would pay. To-day there are no silver ledges that will pay, and, to visit the mines and test the ore, you would conclude that it has always been a gold camp.

Kingman, Arizona.

Record: The Summit mill has started up.

Pioche *Record*: J. E. Peck, who has a lease on the Bullionville pits, has expended some $30,000 in putting in his mill there, and is now in Chicago making final arrangements about his plant.

The De Lamar mine works its ore by the peroxide of sodium-cyanide method, and is locally credited with saving over 97 per cent of its value and works all ore containing over $5 per ton. Its mill treats 300 tons daily, and this one mine pays about 90 per cent of the bullion tax of Nevada.

The Diamond Co. of Eureka is hauling ore from its mines to the railroad depot on a bobsled, the carrying capacity of which is 100,000 pounds.

The Glasgow and Western Exploration Co.'s mill, Cherry Creek, has started up on sixty tons a day, with a capacity of 100 tons daily. At the property of the company at Golconda the mill is now in operation, with results which are satisfactory, while work on the smelter is progressing, and the plant promises to be in operation in the next ninety days. The smelter will have a capacity of 150 tons a day.

OREGON.

Valley Record: The handsome returns from Barron & Shepherd's milling test of ten tons from their mine on Samson creek, ten miles east of Ashland, has caused much interest to be manifested in that section, which is a new district in a mining way.

The first shipment of concentrates, consisting of four carloads, has been made from the Golden Circle mine at the Cable Cove, Baker county.

Baker City *Republican*: The Eureka has lately been the scene of a rich strike of a nature that proves the great stability of the ledge, which maintains the reputation of the Virtue district where so many fortunes have been unearthed by persistent prospectors. The mine is an extension of the Herbert, and the ledge is equally as rich and plentiful as its mother lode.

Jacksonville *Democrat*: J. C. Lewis will build a ditch from Placer to Leland, Josephine county, of ten miles. Three creeks now center at that place—Wolf and Coyote creeks, carried there by ditch, and Grave creek.

The Myrtle Creek Mining & Development Co., Jackson county, in their mines at the head of Johnson creek, at a depth of 50 feet, have a new ledge which prospects $10 in free gold.

Grant's Pass *Observer*: J. W. Robinson came in with $350 worth of gold dust—the result of an eight days' run at his Brass Nail gulch placer. One nugget in this batch was worth $138. Four other pieces range from $20 to $85.

WASHINGTON.

Reports of recent rich gold finds in the Mount Baker placer district are attracting increased attention to that section. During the past six weeks 100 locations have been filed at Mount Vernon, covering over 2000 acres, embracing nearly all the Baker river valley from the Whatcom county line to the confluence of the Baker and Skagit rivers.

The Kootenay water supply plant is to be converted into an electric power plant.

The Everett smelter will soon have in operation a large ore roaster. The building is 50x200 feet. There will be an upper and a lower hearth, each being 12x139 feet. The ore is fed into the upper hearth, and by the action of the ploughs is slowly conveyed to the other end, when it drops upon the lower hearth, where, after being moved the length of this hearth, it is ready for the furnace. The capacity of this roaster is seventy-five tons daily.

The Uncle Sam Mining & Development Co. has been organized at Bossburg to operate sixteen claims—eleven east of Bossburg and five on the Colville reservation.

BRITISH COLUMBIA.

Returns received from ore sent to the Nelson smelter from the Jubilee mine gave values at $3969 in gold and sixty ounces silver per ton.

The Wasco group, Champion station, Salmon river district, has been sold for $20,000 to the Wilkinson Exploration Syndicate of London, England.

P. Burns and W. McKenzie have bonded the Chieftain, on Cariboo creek, for $65,000.

Second Relief, near Creighton, Salmon river, has been bonded for $30,000.

There is excitement in Trout Lake City as the result of a clean-up of some surface gravel in the Lardeau placer mines, near there. From a little over a yard of dirt $81 was received. One of the nuggets weighed over $5, and none of the gold was finer than a large pin head.

The British American Corporation has bought over $3,000,000 worth of mining properties at Rossland.

C. H. McIntosh has resumed negotiations for the Le Roi mine at Rossland.

A rich strike was recently made on the Excelsior group, Slocan City, when two pockets were encountered while driving a raise from the tunnel. Assays from the ore discovered gave the remarkable returns of $136.80 in gold and 775 ounces in silver to the ton.

They are organizing a British Columbia chamber of mines at Vancouver, B. C.

Development work on Toad mountain properties, Nelson, is being pushed. The number of claims on which work is being done is five times as many as last winter.

The British American Corporation has commenced work on the Great Western at Rossland.

A contract has been let for the packing out of 600 tons of ore from the Velvet mine at Rossland.

Dunsmuir & Sons have advanced the pay of all underground workers in the Wellington collieries, Nanaimo, ten per cent.

Spokesman-Review: A Montreal dispatch

gives an insight to the deal which resulted in the sale of the holdings of F. August Heinze in West Kootenay to the Canadian Pacific Railway. It has been known for some time that Heinze's price was widely at variance with the offer of the Canadian Pacific Railway, but the figures have not been made public before The dispatch also sets forth why the deal has been delayed so long. It appears that Government officials have had a hand in the matter. Following is the telegram: "Carlos Warfield, first lieutenant of F. A. A. Heinze, the Rossland railway king, who has been here on and off for some weeks, has joined his chief in Montreal, and developments in connection with the Rossland railway question may shortly be expected. As previously stated, the Canadian Pacific Railway offered Heinze $800,000 for his smelter at Trail and his railway from opposite Robson to Trail and Rossland. Heinze wanted $1,300,000, and rather than pay such exorbitant figures the Canadian Pacific Railway determined to build an independent line to Rossland. But at this point Mr. Blair had to be reckoned with. He declined to approve of the Canadian Pacific plans, and without such approval the company could not stir a peg. Mr. Blair has been hounded from all parts of Ontario by stalwart liberals who want to see Toronto, Hamilton and London secure a fair share of Rossland trade, as against Spokane, and this they could not get, owing to Heinze's high railway rates. Blair has told Heinze that he cannot hold the Canadian Pacific Railway at bay any longer, hence Heinze will doubtless approach the company again with a view to resumption of negotiations. If the Canadian Pacific Railway acquired the smelter at Trail, an immediate drop in the cost of smelting might be looked for, with the immediate result of unlocking millions of Ontario capital."

ALASKA.

The Nowell G. M. Co., next to the Treadwell, is the largest gold mining concern in Alaska. The company recently went into the hands of Receiver Cassel, who makes a preliminary report of the liabilities and assets of the company to the court. The assets show real estate, mining and mill site, claims and improvements thereon, including development work and equipment, of $3,431,070.85. This amount represents the cost to the company of the property, of which amount $2,500,000 is represented by the capital stock of the company issued in payment for certain mining properties transferred to the company. The balance of the total amount, $931,070.85, is apparently the actual amount of money expended in developing and improving the property. Cash, materials and supplies on hand, due the company, in addition to the amount due from the Berners Bay M. & M. Co., $12,039 01; due from the Berners Bay M. & M. Co., $39,-853.80; total, $3,482 963 72. The total liabilities, including interest, due Jan. 1, '98, amount to $1,046,806.16.

When the 520 stamps are in operation the Alaska-Treadwell Co. will have 880 stamps on its vein, the largest number on a single ledge in the world.

THE KLONDIKE.

From Ottawa, is announced, officially, that after careful consideration, and with the advice of Wm. Ogilvie, the Canadian authority on the Yukon country, the Department of the Interior has decided upon the legal conditions which are to govern placer mining in the Yukon. The regulations in substance are as follows:

"Free miner" shall mean a male or female over the age of eighteen, but not under that age, or joint stock company, named in, and lawfully possessed of, valid existing free miners' certificates and no other.

A free miner's certificate shall not be transferable. This certificate may be granted for one year to run from the date thereof or from the date of expiration of the applicant's then existing certificate, upon the payment thereof of the sum of $10, unless the certificate is to be issued in favor of a joint stock company, in which case the fee shall be $50; for a company having a nominal capital exceeding $100,000, the fee shall be $100. Only one person or joint stock company shall be named in a certificate. This certificate shall also grant the holder the privilege of fishing and shooting, subject to provisions of law; the privilege of cutting timber for actual necessities; for the exclusive use of the miner himself, but such permission shall not extend to timber which may have been granted to other persons or corporations.

Certificates may be obtained by applicants in person at the Department of the Interior, Ottawa, or from the agents of Dominion lands at Winnipeg, Man.; Calgary, Edmonton, Prince Albert, in the Northwest Territory; Kamloops and New Westminster, B. C.; at Dawson in the Yukon district, also from the agents of the Government at Vancouver and Victoria, B. C.

No person or joint stock company will be recognized as having any right or interest in or to any claim unless he or it and every person in his or its employment shall have a free miner's certificate, unexpired. And, on the expiration of a free miner's certificate, the owner thereof shall absolutely forfeit all his rights and interest unless he shall, on or before the day following the expiration of such certificate obtain a new free miner's certificate. Nevertheless, should any co-owner fail to keep up his free miner's certificate, such failure shall not cause a forfeiture or act as an abandonment of the claim; but the interest of such co owner, pro rata, according to their former interests so provided, nevertheless, that a shareholder in a joint stock company need not be a free miner.

Every free miner shall, during the continuance of his certificate, have the right to enter, locate, prospect and mine for gold and other minerals upon any lands in the Yukon district, whether vested in the crown or otherwise, except upon Government reservations and land lawfully occupied. A creek, gulch, river or hill claim shall not exceed 250 feet in length in the general direction of the stream or ravine on which it fronts, and shall not be more than 1000 feet in width.

Every alternate ten claims shall be reserved for the Government of Canada; that is to say, when a claim is located, the discoverer's claim and nine additional claims adjoining each other and numbered consecutively will be opened for registration. Then the next ten claims of 250 feet each will be reserved for the Government, and so on. The penalty for trespassing upon a claim reserved for the crown shall be immediate cancellation of any entry or entries which the persons trespassing may have obtained, whether by original entry or purchase, for a mining claim, and the refusal of the acceptance of any application which the person trespassing may at any time make for a claim.

If any free miner or party of free miners discover a new mine, and such discovery shall be established to the satisfaction of the Mining Recorder, creek, river or hill claims of the following size shall be allowed:

To one discoverer, one claim, 500 feet in length; to a party of two discoverers, two claims, amounting to 1000 feet in length; each member of a party beyond two in number a claim of the ordinary size only.

A claim shall be recorded with the Mining Recorder in whose district it is situated within the ten days after the location thereof. The entry shall not be granted for a claim which has not been staked by the applicant in person in the manner specified in these regulations.

An entry fee of $15 shall be charged the first year, and an annual fee of $15 for each of the following years. A royalty of 10 per cent on the gold mined shall be levied and collected on the gross output of each claim. The sum of $2500 shall be deducted from the gross annual output of a claim when estimating the amount upon wich the royalty is to be calculated, but this exemption shall not be alliowed unless the royalty is paid at a banking office or to the Gold Commissioner or Mining Recorder.

Regulations have also been adopted for the issues of leases to persons or companies who have obtained a free miner's certificate to dredge for minerals other than coal in the submerged beds or bars of rivers in the provisional district of Yukon, in the Northwest Territory. They provide that:

The lessees shall be given the exclusive right to subaqueous mining and dredging for all minerals with the exception of coal in and along an unbroken extent of five miles of a river. No more than six such leases will be issued in favor of an individual or company, so that the maximum extent of river in and along which any individual or company shall be given the exclusive right above mentioned shall under no circumstances exceed thirty miles. The lease shall be for a term of twenty years, renewable in the discretion of the Minister of the Interior. The lessee shall have at least one dredge in operation upon the five miles of river leased to him within two seasons from the date of his lease, and if during one season, when operations can be carried on, he fails to efficiently work the same to the satisfaction of the Minister of the Interior, the lease shall become null and void, unless the Minister of the Interior shall otherwise decide; provided, that when any company or individual has obtained more than one lease, one dredger for each fifteen miles or portion thereof shall be held to be compliance with this regulation.

The lessee shall pay a rental of $100 per annum for each mile of river so leased to him. The lessee shall also pay to the crown a royalty of 10 per cent on the output in excess of $15,000.

UTAH.

On the 425-foot level of the Black Dragon they cut through a 14-foot vein, with pay streaks all through it.

The Sunbeam Con. M. Con. is drifting for the downward continuation of the rich ore found in the Woodmansee ground.

Mercur *Mercury*: In the Daisy the vein is being crosscut every 30 feet, and in many instances on the lower levels shows a width of from 20 to 25 feet. Ore bins are being put in at the end of each drift to facilitate the handling of the ore, and the mine is being put in shape for large extraction when the time comes. There are already 1800 feet of development in ore.

Salt Lake *Tribune*: The Creole at Stateline has excellent prospects. The shaft is now down 250 feet, where a station is being put in, and there is a lot of $22 gold ore in sight. The company feels safe in doubling its mill, and cyanide tanks will be added, as by the present system only 78 per cent of the gold is saved.

Tribune: At the Highland Boy, Bingham, 30,000 feet of tunnels, including drifts and crosscuts, have been laid bare. Oxidized ore has been found in paying quantities, while the copper deposits are rich. The capacity of the mill is fifty tons of oxidized ore, while forty tons of copper ore are daily sent to a smelter. The mill has a leaching capacity of 500 tons, divided into ten tanks of fifty tons each. There are two crushers, with two driers of seventy-five tons each. An air compressor is installed in the No. 6 tunnel. It will operate three drills.

The Highland Boy mine, at Bingham, is turning out regular shipments of crude copper ore, in addition to eighty tons that are being furnished the mill.

Tribune: The Ajax M. Co. reported with 100 tons of ore from its property, that yields as much as 29 per cent in copper, five ounces in silver, and gold of the value of $1 50 a ton.

The Steamboat M. Co., at Park City, is putting in a water plant to run drills so as to facilitate work in the long tunnel they are running in their property at the head of Snake Creek canyon.

Record: An upraise is being made at the Valeo to connect the tunnel with the incline on the ledge from above.

The Ontario mill, at Park City, is to be closed down, the old plant removed and a modern one put in, as it has outlived its usefulness of nearly twenty-one years continuous dropping.

IDAHO.

(Special Correspondence.)—The property of the Mascott G. M. & M. Co., Ltd., is in Pierce City mining district, Shoshone Co. At a depth of 100 feet drifts will be started. The company has already ordered a mill and will place an amalgamator. The ledge is 3½ feet in width, free milling. Assays have ranged from $26.11 to $450.60 per ton.

De Lamar *Nugget*: The west half of what is known as the old De Lamar mill, is now undergoing a change amounting to a revolution in the mill process. Some pans and their accompanying settlers have been torn out, and the space they occupied is being filled with iron leaching tanks. There will be ten of these tanks put in, averaging in area 10 feet by 20 feet with a depth of 3½ feet, and two large circular storage tanks, to hold cyanide solution. As soon as this part of the mill has been revolutionized and satisfactorily tested, it is probable that the stamps will all be hung up and the same change be made in the other half of the pan mill. It is believed by the manager that the new process will save an equal percentage of values, and it is certain that it will effect a large saving in expense, because the power required to run the batteries, pans and settlers will be dispensed with. Five hundred cords of wood were consumed per month when all the pans and batteries were running, and with the new process only the rock breakers will be employed, and that only on a minor portion of the ore. The total amount of ore crushed in December was 4350 tons. The value of the bullion produced in the mill was $38,820, and the total income was $40,370. The expenses were $39,365, leaving a profit for the month of $1005 An air compressor weighing 8000 pounds and fly-wheel weighing 3500 pounds are being put in the mine.

The Hoodoo Hydraulic Gold M. Co. at Princeton has its giant and flumes in position to take advantage of the first chinook in the spring.

MONTANA.

In the Nippur mine in Butte the Montana Ore Purchasing Co. has cut a 40-foot lead of copper ore on the south crosscut at the 550-foot level.

The Montana Ore Purchasing Co. extracts from the Rarus and Glengarry mines nearly 700 tons of copper ore every twenty-four hours.

Miner: A new company is being formed in Butte of local mining men and capitalists to work the Hesperus lode.

The Basin Gold & Copper M. Co. has been formed to operate the Hope mine at Basin. Men have been engaged to remove the water, when the shaft will be developed from the 300 to the 500-foot level. The Hope is credited with producing over half a million dollars' worth of ore and paying $200,000 in dividends.

The Hope mine at Basin will resume operations shortly under a new management.

In the Heart Solo mine, Brown's Gulch, they have uncovered a body of ore. They will send nine tons to the Butte smelter for a test.

In fifteen years Montana's annual copper output has risen from 9,058,284 pounds to 250,-000,000 pounds. From the Butte district alone, during this period, $200,000,000 worth of copper has been taken.

Butte *Inter-Mountain*: The Boston & Montana, with its continuous ore body from the Mountain View to the West Colusa, has a reserve that cannot be exhausted in many years. The Butte & Boston mines will be producers this year. The Parrot Co. is engaged in opening up new properties. The Heinze properties add to the output; the Gagnon, Original and Colusa-Parrot are still contributors, and will be for years to come.

The Kennett M. Co.'s new 40-stamp mill at Sheridan is crushing about 120 tons of ore a day.

WYOMING.

Lander *Clipper*: Cook & Richardson are working the old Caribou mine on a lease. At a depth of 75 feet the vein is 2 feet 4 inches wide. This mine has a record of $500,000.

The Empire State mine, Atlantic City, has been sold to Salt Lake parties for $18,000.

SOUTH DAKOTA.

T. J. Grier of Deadwood, Supt. of the Homestake mine, says it operates 400 stamps and handles 2800 tons of ore daily. It and several other contiguous mines are chiefly the property of the Hearst estate and J. B. Haggin. Last year their combined production was in round figures something like $3,250,000. Throughout the State there is great activity in mining, and there is every reason to believe that the production of '98 will show a large increase over last year.

MICHIGAN.

Geo. Wagner has completed his report on the conditions of upper peninsula mines and miners of Michigan and forwarded it to Labor Commissioner Cox. The Lake Superior district last year produced nearly three-fourths of the iron mined in the United States, the output being 12,000,000 tons in that State. The Marquette range led with 2,591,496 tons, 2969 men employed; Gogebic, 1,710,509 tons, 2252 men; Menominee, 1,335,000 tons, 2107 men; Crystal Falls, 276,000 tons, 497 men; total, 5,943,000 tons, 8825 men. The copper mines, exclusive of the Calumet & Hecla, produced 58,497,170 pounds of ore and employed 4540 men, of whom 1087 were in the Quincy and 1087 in the Tamarack.

MISSOURI.

State Mine Inspector Quinby of Missouri reports that if present conditions are maintained to the end of the fiscal year the four counties of Jasper, Newton, Greene and Lawrence will produce more than $3,000,000 worth of ore. He says a large amount of capital was invested in developed and undeveloped mining lands during the year 1897, most of it coming from St. Louis and Kansas City, and he thinks that the profits on the output of Missouri lead and zinc mines this year will be great. He reports that Missouri is enjoying the greatest period of mining activity it has ever known.

COLORADO.

In working the Old Settler property on the divide between Trail Run and Turkey creek they found a vein along the surface, with free gold in the quartz. The values are said to be high in gold.

The Quaker Co., operating the Monte Cristo property on Spanish Bar, recently began a crosscut from the bottom of the shaft for the purpose of reaching a parallel vein some 35 feet away. This has now been reached and the streak of high-grade ore running $100 per ton is about 12 inches wide.

They are sinking a winze in the Seaton mine, Idaho Springs, to connect the second level with the third. This will go down on the new showing of high-grade mineral which was recently found by crosscutting from one wall to the other. The mine is also producing a heavy tonnage of this and milling ore, and the output for the coming year will about double that for 1897.

In working the Excelsior claim on Dry gulch a new streak of mineral was encountered, which shows 5.43 ounces gold and 676 ounces silver.

The Mayhem Investment Co. of Denver has paid $40,000 for the Village Belle mine, and the El Dorado G. M. Co. bought the Enterprise and Bobtail mine for $100,000 cash and $50,000 in stock. Both mines are located at El Dorado.

After several years of work the Dollie B. mine, in Big Evans gulch, has become a producer. A short time ago a large body of pay ore was discovered and after it had been developed and shown to be continuous shipments were commenced. The ore carries both gold and lead.

A shaft sunk on the G. M. Favorite, Leadville, has exposed quite a body of gold-bearing ore at the depth of 350 feet.

Colorado Springs *Telegraph*: Preparation is being made to open up the big ore chute of the Ingham at great depth. Excavations have been completed for the installation of a big plant of machinery to sink the winze from the tunnel level. The winze will be sunk off the vein a distance of some 25 feet, and will cut the ore on its dip. The ore body at present opened up at the lowest, or 265-foot, level is from 12 to 18 feet in width, though it is only being taken out at present to a depth of 10 feet. The vein matter runs about an ounce and a half of gold to the ton.

A Colorado Springs dispatch says the gold production of the Cripple Creek district during the month of January was in round figures $1,200,000. The dividends declared by the eleven mining companies operating there amounted to $146,000, while fully $75,000 more was cleared up by mines under private ownership.

At Aspen the Free Silver pumps are to be pulled. This is locally interpreted as meaning that deep mining in the Aspen district is at an end for several years, and that deep mining there has proven a failure. Some 10,000 feet of workings will be flooded, including the lower workings of the Mollie Gibson.

Silverton *Miner*: The Neigolds, Cunningham gulch, broke into 18 feet of ore which averages from $15 to $20 per ton and carries galena values.

Record: After sinking 78 feet and crosscutting 55 feet, the Whitehorn Mines Co., at Whitehorn, has cut a 4-foot vein on the Bruce carrying gold.

In Cameron district several properties have been bought or leased by men who will develop them. Cripple Creek men are in the district, getting possession of claims.

Denver *Mining Record*: An ore chute has been opened in the Monte Christo claim, Copper mountain, belonging to the Magnet Rock G. M. Co. Many have prospected for ore on this property. At the bottom of an 80 foot winze, from the bottom of the 120-foot level, what looks like the apex of a good ore chute has been opened. The operators think they have encountered an extension of the famed chute from which shipments have been made in the Columbia tunnel.

The best part of the Christmas mine on Bull hill is now being operated under a two years' lease. Ore is shipped at the rate of thirty tons per week, running from one to two ozs., from the fifth level, at a depth of 238 feet.

Colorado Springs *Telegraph*: Samuels & Co. have developed the first producing mine on Carbonate hill, and, to all appearances, they have a splendid proposition in their lease on the Elkhorn. They recently opened the ore body in a 50-foot crosscut from the 190-foot shaft and are now starting drifts on the vein. The pay streak is about 16 inches in width and yields ore of an average value of over $100 in gold.

In running the Cowenhoven tunnel, at Aspen, they ran into mineral in the quartzite which assays eighty ounces in silver to the ton, besides a good percentage of lead.

Telluride *Journal*: The Dunlap group of prospects, in Gray's basin, a branch of Bridal Veil, have been bonded to W. F. Buckley for $32,500.

NEW MEXICO.

The Homestake, Maud M. and Ajax, in Pioneer gulch, show an improvement in the quantity and quality of ore.

The production of coal in New Mexico for the fiscal year ending June 30, 1897, is as follows: Bernalillo Co., 235,937 tons; Colfax Co., 203,537; Lincoln Co., 4000; Rio Arriba, 21,400; Santa Fe Co., 225,000; San Juan Co., 1825; a total of 733,839 tons. The estimated value of this total product at the mines is $1,198,915. The total number of men employed in and about the mines is reported as follows: Miners, 1154; outside men, 171; boys, 40; a total of 1365.

La Belle *Cresset*: The owners of the Blue

Copper Glance expect to resume work in February. Five-pound samples from this property, 5 feet from surface, gave gold values of $12.40. The vein is known to run strong in copper.

The Edison mine at La Belle has been sold.

ARIZONA.

(Special Correspondence). — The Virginia Camp is in the southern portion of the old Weaver district, about ten miles east from the Colorado river, and about twenty-five miles in a northwesterly direction from Chloride, Mojave county. The camp was discovered one year ago by Cook Bros. & Blythe. The ore is white spar and carries from $5 to $300 per ton is gold, very little silver. The white spar ledges in this camp have been known of for many years, but they were white spar, and the prospector knew white spar did not carry mineral, so there was no need of testing the ore. There is an old trail that crosses one of the best ledges, having been traveled for many years. On either side of the trail the ledge shows free gold in many places, but no one would look at gold in white spar. On the Virginia mine the ledge has been crosscut by 30 feet of open cuts and shows 7 feet of ore, value $100 per ton. The Tennessee mine has a shaft 15 feet deep, exposing a 4-foot ore body. The Bee Hive mine shows an ore body 12 feet wide, of good value. Cook Bros. & Blythe have a number of claims from which they have shipped ore yielding $100 per ton at the sampling works. The Blue Jay and Tillman are promising prospects owned by Gatewood & Tillman, much of the ore yielding $100 per ton free gold.

For steam generating, coal instead of wood is being used by the mills at Tombstone.

Old Glory 30-stamp mill, at Oro Blanco, is running steadily on good paying ore.

S. Y. Barkley will resume work in the Old Boot mine in Silver Ball mining district. This mine was at one time a large producer of bullion.

Nogales *Vidette*: It is reliably reported that the Columbia Smelting Co., at Rollin, will start up again soon, and that all the indebtedness of the present company will be liquidated by the new company.

At Oro Blanco the Franco-American Mining Co.'s mines are developing very handsomely. There is a large body of ore in sight and occasionally very rich specimens of copper are found. The mine also carries gold in a most satisfactory manner. The Old Glory 30-stamp mill is running steadily on good ore, and it is understood that the mine is paying well.

The 10-stamp mill at the Fuller group of mines, Squaw creek, is running steadily.

Yuma *Sun*: B. A. Haraszthy has bonded his Gila City district group of placer claims, consisting of the Golden Slipper, Happy Jack, Blue Mine, Gold Deposit, Eclipse and St. Patrick claims, to A. S. Adams of San Francisco for $30,000. J. H. Johnson of Kansas City has secured a bond on the Ophir, Little Lizzie, Colorado and Bob Ingersoll mines, three miles from Harrisburg, from R. Toohey of Phœnix for $75,000.

MEXICO.

At Minas Prietas, Sonora, the Grand Central mines were purchased by the Exploration Company of London in August, 1896. The profits for the first year's operations were £81,000, of which £37,500 was paid in dividends. The mine is paying steadily under the management of E. R. Abadie. The new shaft is 860 feet deep, and the ore body has been opened on the seventh and eighth levels for over 200 feet and an average width of 16 feet. The shaft has four compartments and is fitted with a 500 H. P. hoist, having a capacity for 3000 feet. The mill contains thirty rapid-drop stamps.

El Mundo announces that the gold production of Mexico for last year was $6,861,826—a gain of more than $800,000 over '96 and of more than $2,000,000 over '90.

Two Republics: Messrs. Reed and Gunny, the gentlemen who purchased the San Luis mine near Coronilla last January, in the State of Guerrero, are now negotiating for the mines and mill belonging to the Compania Mexicana in the district of Mina. The mines are situated near Coronilla, San Nicolas del Oro and Tepantitlan and are about thirty in number. The mines near Coronilla yield gold; those near San Nicolas del Oro yield gold and silver and those near Tepantitlan yield gold, silver and lead. Most of the ore mined from these properties has been treated in arrastras. At present there is a 5-stamp mill on the San Cayetano, and we understand it is the intention to increase this plant considerably. The San Felipe mine still continues to yield very rich gold ore. This is the only strictly gold property that has been discovered near Coronilla thus far. All the others carry considerable quantities of silver also.

Mexico has adopted a new mining law as follows: Art. 1. Upon the expiration of the three months period, fixed by Art. 13 of the mining law, during which the explorer only has a right to acquire mining claims, no new exploration permits will be recorded on the explored land, nor will notices of intended exploration work be admitted for the same ground until after the expiration of six months, during which the ground will be open and free for the acquisition therein of mining claims. In places where possession of mining claims has been obtained, explorations may only be made on ground two hundred meters distant from the boundaries of those claims and in abandoned mines. In all cases, the explorer must define the location and the boundaries of the ground with clearness and precision.

Art. 2. The agents of the mining departments shall post upon the board of notices at their offices a copy of all permits, notices or administrative acts, referred to in Art. 13 of the mining law, fixing at the end of such copies the exact dates of beginning and termination of explorations.

Under this new law, exploration privileges cannot be renewed on mining zones after the expiration of the first three months, until after an intermission of six months, during which six months the land will be open to the location of mining claims. The new law corrects three abuses in the old law. First, it prevents the keeping of lands tied up under the cover of the zone permit for years by renewing the zone every three months. Second, the practice of having indefinite boundary lines for such zones is abolished. One cannot locate a zone with the broad statement "my zone is eight leagues square with such a mountain for its center." The new law requires that the boundary lines of each zone must be clearly defined in the permit. Third, all zone permits, giving the exact boundary lines of each zone, must be kept posted on the notice boards in the office of the mining agent of the district in which the zone is located, for the inspection of any person interested, and the permit must show the dates of the beginning and ending of the three months' life of the zone. Heretofore, information of this character was not easily obtained and it was an easy matter for an explorer to renew his zones without any one knowing when the three months expired.

CHINA.

United States Consul Fowler of Ningpo, China, in a recent communication, writes as follows: "Vast untouched beds of sheet mica lie within fifty miles of Kiao-Chow bay. The extent of these mica deposits is as yet unknown, but, so far as I have investigated, they promise to handsomely repay those who are fortunate enough to obtain a franchise for working them. The rolling, sandy hillocks, under which the mica lies, are but poor lands for cultivation, and hence their use for mining purposes detracts nothing from the cereal-producing capacity of the region. The mica crops out at intervals over some fifty square miles and in veins sometimes 10 feet thick. Of course, much of it is discolored by foreign minerals, but what I have seen assures me that there are vast quantities of good commercial material."

COREA.

The report of Consul-General Mann at Seoul, Corea, gives information concerning the United States gold miners' concession in that country. The report says the gold district is twenty-five miles in width and includes the richest country in Corea. The concession is for twenty-five years and includes the right to mine other minerals. J. R. Morse, who has the concession, has granted a sub-concession to another American, L. Hunt, who has succeeded in interesting American capital to such an extent that a sub-company will shortly install a modern mill of forty stamps. The whole country has been honey-combed by native miners in the past, and, to promote further prospecting, these people are given the mining rights for one year on the new property. The Corean miners are patient, strong, enduring and easy to deal with. Their wages are about 40 cents a day in silver. The report says water is the greatest obstacle.

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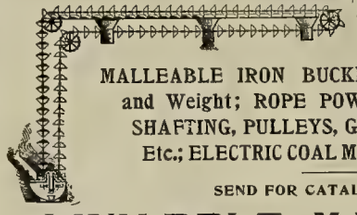
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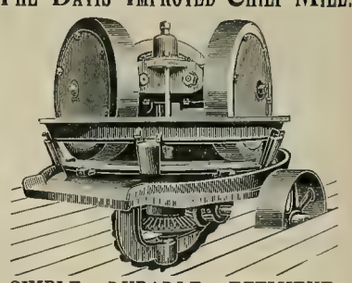
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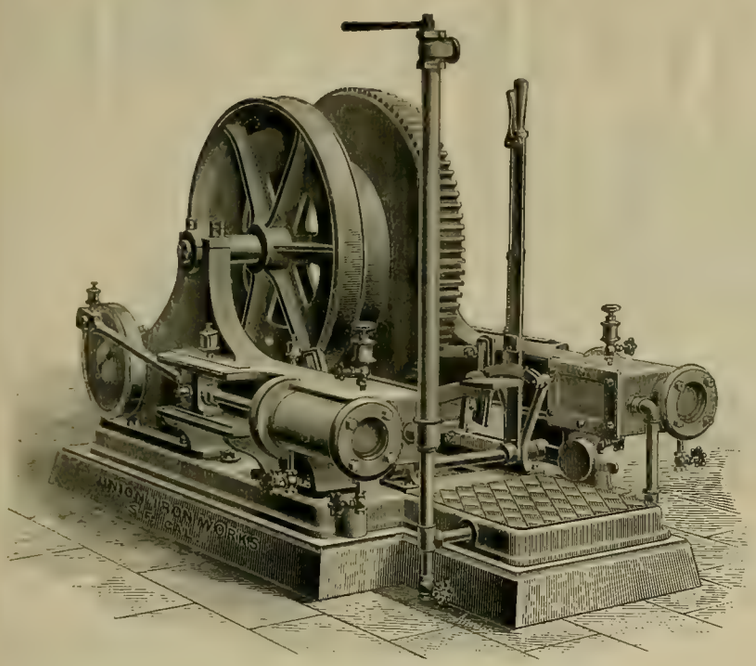
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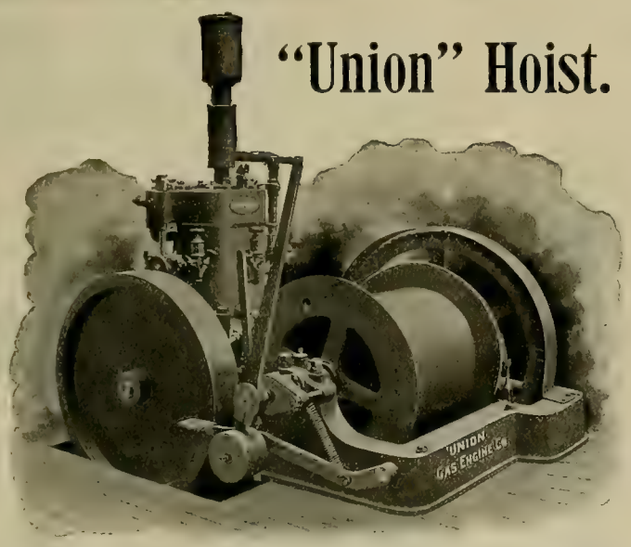
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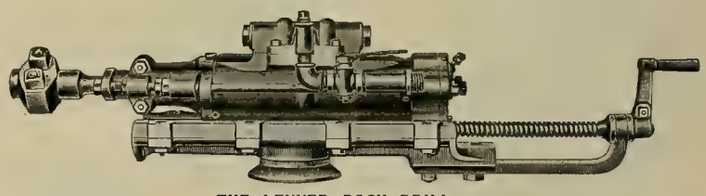
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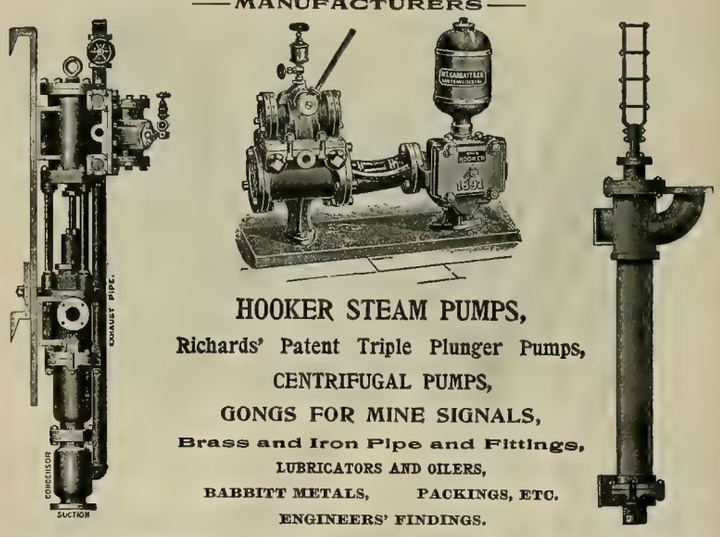
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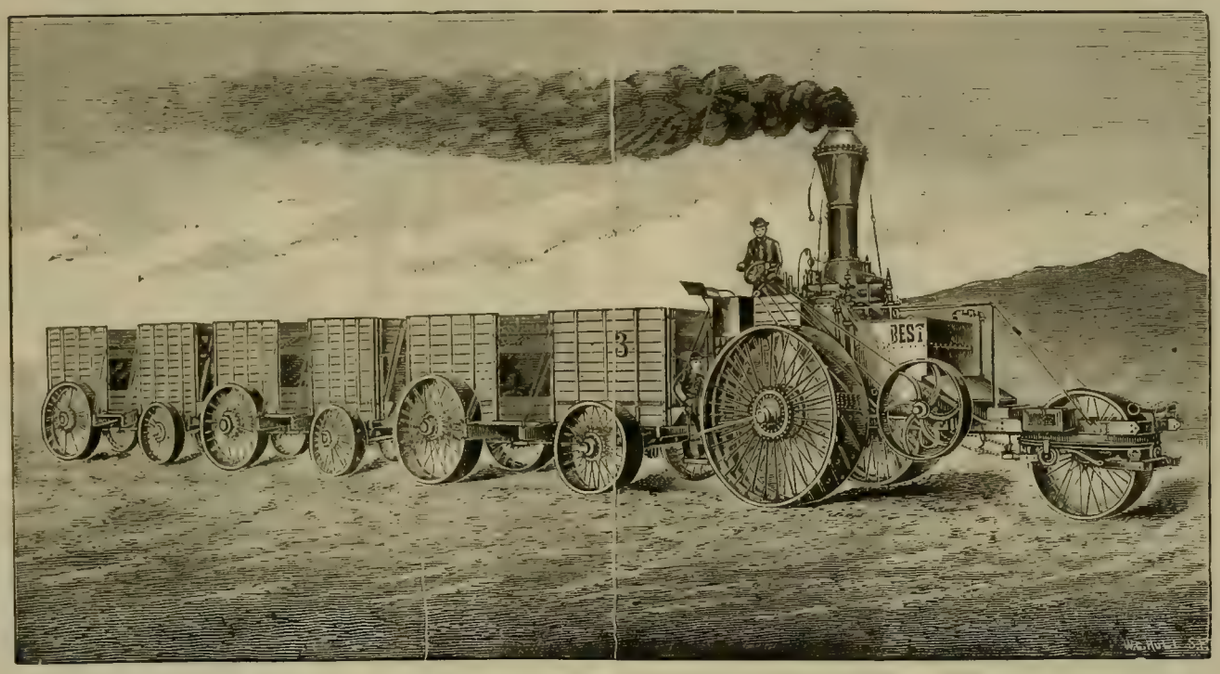
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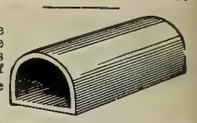
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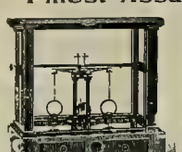
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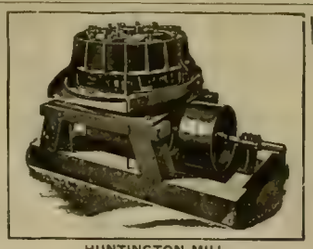
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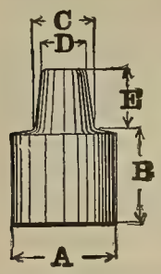


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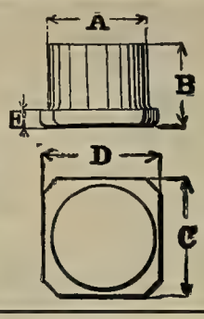
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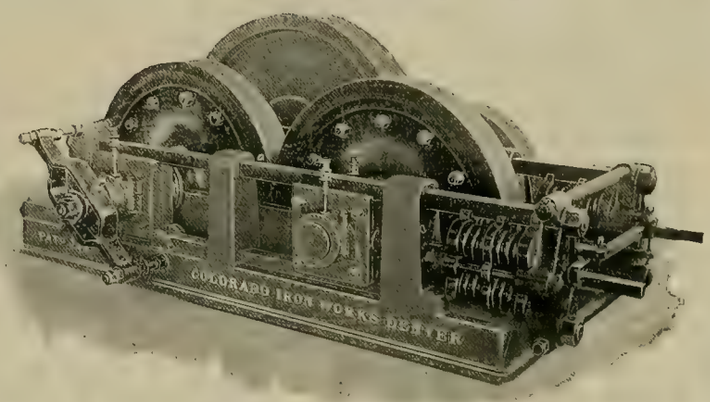
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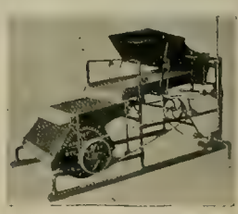
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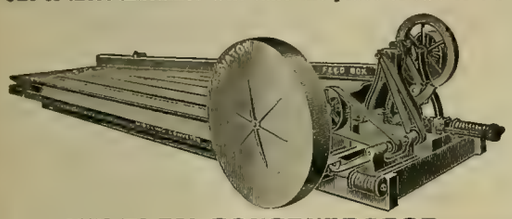
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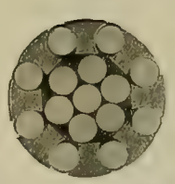
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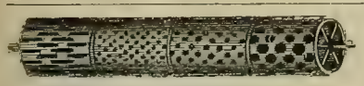
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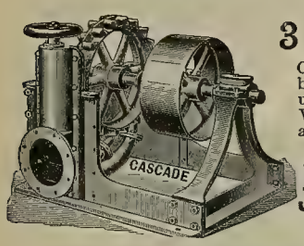
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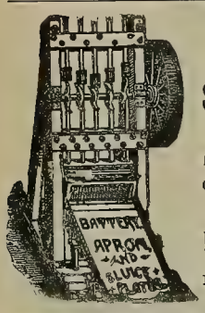




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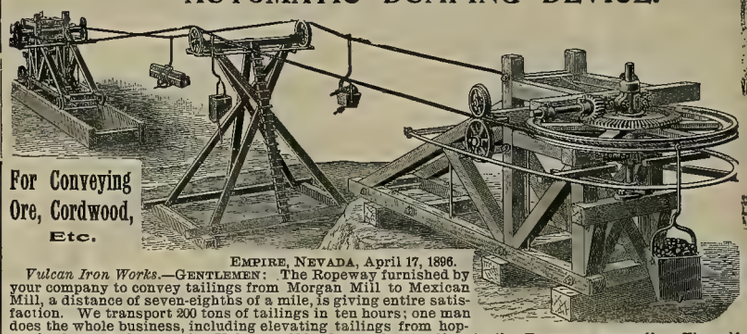
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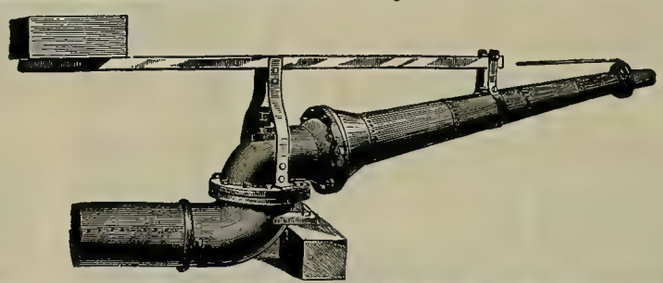
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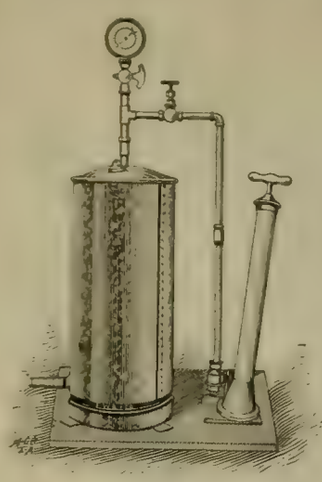
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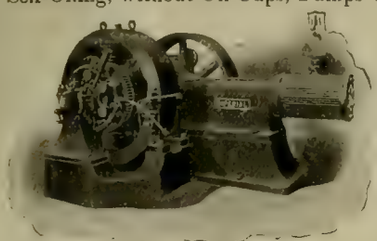
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Stamp Mills, Ore Crushers, Ore Cars, Etc.
Tremain Steam Stamp Mills.
Oil City Boilers and Engines.
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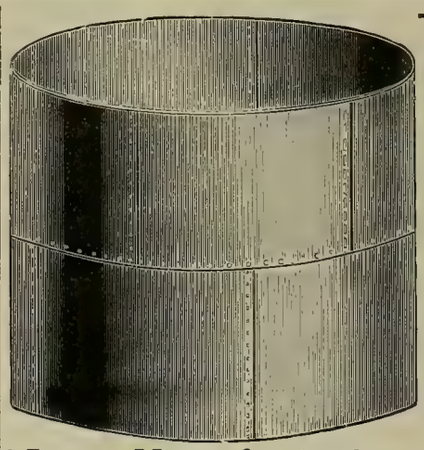
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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 3, 1898.

Business continues fairly active, with the volume of goods going out in excess of the corresponding time in 1897. The buying continues of a conservative character, owing to dry weather in the agricultural sections and cold weather in the mines, freezing the water supply in many districts. The outfitting for the Klondike is quite a factor in trade circles. With the opening of navigation on the Yukon the call for goods from that section will be very large. It is stated that the demand for mining implements and machinery will be large also. The activity in barge, steamboat and steamship building for Alaska is calling for liberal supplies of hardware and machinery, and at the same time giving employment to several hundred extra men.

The local money market is practically unchanged. The supply is in excess of the demand with prospects not favorable for any increase for some time to come. The dry weather is creating uneasiness with the timid; even the more conservative are not disposed to put out much money in sections that are likely to be affected unfavorably by a drouth. Good soaking general rains within the next two weeks will change the complexion of things and create a feeling of confidence. The disbursements of funds in this city last month by corporations and municipal, State and national authorities aggregate over $5,000,000, the bulk of which has gone back into banks. The disbursements that are being made by persons going to the Klondike are increasing in volume, which adds still more to the plethora of funds. The East reports a steadily increasing ease in the markets, with the holdings largely in excess of trade wants. This makes the rates of discount easy.

New York Silver Prices.

NEW YORK, Feb. 3. — Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	26¼	56⅞
Saturday	26 5-16	56¾
Monday	26¼	56½
Tuesday	26⅛	56¼
Wednesday	26 1-16	56⅜
Thursday	26	56⅜

	Copper.	Lead.	Iron.	Tin.
Fri.	10 90 @11 00	3 60	10 00@12 25	13 85
Sat.	10 90 @11 00	3 60	10 00@12 25	13 85
Mon.	10 90 @11 00	3 57½	10 00@12 25	13 85
Tue.	10 90 @11 00	3 57½	10 00@12 25	13 85
Wed.	10 90 @11 00	3 55	10 00@12 25	13 80
Thur.	10 90 @11 00	3 55	10 00@12 25	13 80

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.82¾
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	58¾
Mexican Dollars nominal	47@—

SILVER.—The market has shaded off the past week in sympathy with Europe, where the uncertainty of complications over the Eastern question is quite a factor. The continued stringency in the money markets of India, combined with an agitation for a gold standard there, must have an effect on the market. When the demand sets in India for crop-moving purposes in March and April, it is quite possible that country will draw considerable silver, which, if proven correct, will favorably affect the white metal.

MEXICAN DOLLARS.—The demand, as usual at this season, is slow, and liable to continue so for the next three months.

COPPER.—The output of this country in 1897 is placed at about 24,000,000 pounds over 1896. Notwithstanding this large increase in production the stocks held are not excessive, owing to the large increase in consumption abroad, and this, too, in the face of the engineers' strike in England. This shows that, while England's trade in this particular direction has suffered, the continent, particularly Germany, has been the gainer. With the strike now of the past, English requirements ought to enlarge, which will be still further influenced when India's new cereal crop season commences.

Our market is quoted as follows:

Ingot casting, jobbing	— @13
Ingot " wholesale	— @12½
Sheet copper	— @16½
Bolt ¾ and 5-16, 20c; ⅜ and larger, 16½	

TIN.—The market at the close is a shade easier for pig. For plate our market is quite irregular and hard to quote close. Imports the past week aggregate over 37,000 boxes from England. This, it is said, was placed to arrive.

The market is quoted in jobbing lots as follows:

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, "	4 00@—

QUICKSILVER. — There is a light but steady demand.

Our market is quoted at $39 for domestic consumption and $35@36 for export to the west coast of Mexico.

LEAD.—The demand, as usual to the season, is light on this coast and in the East. No changes have been made in quotations, but it is understood concessions are obtainable in sympathy with easier markets at the East.

Pig	4 75	@	5 00
Sheet	....	@	6 50
Pipe	5 30	@	5 80

IRON.—The consumption of pig on this coast, particularly in this city, is in excess of the corresponding time in 1897. Imports the past week aggregate 300 tons pig from Philadelphia and 500 tons from New York. The East reports heavy exporting of pig, particularly Southern, while the home consumption shows a steady increase.

SHOT.—The market is easy at quotations.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

COAL.—A private circular reports as follows: "A total of 5918 tons from Australia in thirty days means short stocks on hand here now, but this will be relieved this month, as we have thirteen vessels with 32,000 tons of Australian coal due here before March. The loading list at Newcastle and Sydney has been increased about 26,000 tons since last mail left (Jan. 6th); then the reported coal engagements footed up 70,000 tons capacity, now 96,000 tons. Of the thirty-nine vessels chartered, only sixteen have so far been loaded. High prices must assuredly rule the balance of this year, for all characters of fuel, as our northern mines will be strained to supply us locally, in addition to the calls which will be made on them to coal all the steamers that will be engaged in the Alaska trade. Jobbers have marked up all the grades of domestic fuel, as this character of coal is very scarce. Steam grades so far are not affected."

Receipts of coal for the week ending Tuesday were as follows, in tons: Departure Bay, 4728; Philadelphia, 1948; Nanaimo, 2310; Coquille river, 145; Puget Sound, 3500. Total, 9631 tons.

PLATINUM.—The market is steady.

Our market is quoted in a jobbing way at $15 per ounce and for scrap $10 an ounce.

BORAX.—The market is firm.

demand ruling.

The market is quoted as follows:

Refined, in carload lots, in barrels	7
Refined, in carload lots in sacks	6¾
Powdered, in car lots	7
Concentrated, "	6½

ZINC.—The market is steady.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 45 to 50 cents per pound for ingots.

ANTIMONY.—The market is steady.

POWDER.—The market is steady at current quotations.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17½c, according to strength and quantity; No. 2, from 9 to 11c, according to strength and quantity.

Chemicals.

Business continues to be confined to legitimate wants, with no change in quotations reported, and none looked for until chop lots in jobbers' hands have been exhausted. Our New York advices state that business is quiet, with no changes in quotations reported.

CYANIDE OF POTASSIUM.—The market is steady.

Our market is quoted for chemical pure 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The market is firm.

We quote in a jobbing way at 1¼c per lb for 66%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6¼@7c per pound in carboys.

BONEASH.—There is a fair export movement.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady.

We quote in a jobbing way at 4c per pound.

BISMUTH.—The market is firm.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—The market fluctuates for round lots, but is steady for small.

Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

Mining Share Market.

SAN FRANCISCO, Feb. 3, 1898.

The market has been quite active throughout the week under the lead of Sierra Nevada. On last Thursday it sold at $1.10, then down to 75 cents, from there to $1.20, then back to 80 cents and again to $1.10. The lively fluctuations in Sierra Nevada cause lively comments on the street, but no one seems to know who is back of it, for the public is not in it. When Sierra Nevada moved up, the other shares sympathized slightly; but when it went back, the others struck a still lower level, some selling lower than for over a year. The decline of Sierra Nevada from $1.20 to 80 cents brought Con. Virginia down to 93 cents, which is the lowest figure, excepting in 1896, when it sold at 75 cents, at which it has sold for several years. Ophir sold down to 51 cents and Mexican to 21 cents. Chollar and Savage, in the middle, also touched low-water marks, as did some in the Gold Hill group. The ups and downs in Sierra Nevada are said to be based on running in and out of ore in the Reilly tunnel, but to an outsider it looks like manipulation to shake holders out of other shares, for traders will operate in the more active shares. There are mines on the Comstock where a much better showing has been made than is being done in Sierra Nevada, yet the shares hardly budged out of the regulation blackboard prices. While saying this, it must be admitted that the ground in which they are working in Sierra Nevada is of a most interesting character, and experienced miners contend they are liable to run into a large body of ore. The work in Chollar and Potosi seems to be laying the foundation for active exploiting in the mines. It suggests the possibility that several levels from the 1000-foot down to the Sutro tunnel level. If this should be done, it is thought the shares will show as much life and activity as Sierra Nevada displays. The work under way in three of the mines in the Gold Hill group points to more active exploiting in the spring, which, if done, will bring the shares in that group into play.

The news from the Comstock mines centers largely in Sierra Nevada, where they have struck fair grade ore, assaying about $18, in the Reilly tunnel at a depth of about 140 feet from the surface. The striking of this ore will unquestionably cause the starting of work lower down, so as to tap its downward continuation, but the level on which it is struck will be exploited to find its extent and value. In Utah they are driving ahead in the north drift. At last advices they were in soft porphyry showing vein matter and clay seams. In Sierra Nevada the Reilly tunnel is in 700 feet; at a distance of 663 feet in they struck ore going from $18 to $30 in gold. On the 900-foot level they are pushing ahead on No. 5 west crossdrift. They are in about 150 feet. In Union the work is confined to east crossdrift No. 2 on the 900-foot level. They are in about 175 feet. In Mexican east crossdrift on the 1000-foot level, about 230 feet from the Ophir line, is in about 675 feet. There is no change in the material. West crossdrift on the 1000-foot level of Ophir is in nearly 850 feet. The face is in porphyry showing clay and narrow seams of vein matter. West crossdrift on Central Tunnel level is in over 400 feet. The material is the same as found on the 1000-foot level.

In Con. Virginia the work is still confined to the 1550-foot, 1650-foot and 1750-foot levels. In an upraise from the 1650-foot level they cut small streaks of ore, from which fourteen tons were saved, assaying over $64 to the ton. The general character of the work and formation of ground in the mine do not show any change. The joint east crossdrift of Best & Belcher and Gould & Curry on the 900-foot Bonner shaft level is in over 650 feet. Nothing new is reported in the Savage letter. In Chollar the main airway on the 100-foot level has been repaired and is in good condition. They have put two sets of timber in the main incline above the 1000-foot level. Good progress is being made to connect the 1600-foot station with the Comstock tunnel. The joint work by Potosi and Bullion is confined to drifting south from the tunnel level in Potosi. The joint repairs to the Crœsus shaft are completed. They are crossdrifting east from the upraise above the tunnel level. The Alpha management forund a 5-cent assessment down here and $12 to $18 ore in the mine in an upraise from the 500-foot level. The surface tunnel in Con. Imperial is in over 475 feet. No change reported. The joint west crossdrift is in nearly 1800 feet. The flow of water is still quite strong. Nothing new comes from Challenge, Confidence or Yellow Jacket. In Crown Point they are raising low-grade ore from the 700-foot level to make a test run. Fair progress is being made in the joint Crown Point-Belcher upraise from the 850-foot level. Some fair grade ore is being extracted and raised by Belcher. No change is reported in Justice, Caledonia or Seg. Belcher since our last review.

In carrying out recent suggestions, the Savage-Hale & Norcross-Chollar-Potosi shaft No. 1 on the Brunswick lode will be sunk to the 800-foot level, so as to explore to the west at that depth. It is the belief of mining men that a body of ore will be struck on that level. The west workings in the other mines are being watched with interest, as is the south drift in Potosi, to see if recent deductions prove correct. The joint east crossdrift on the 600-foot level of Gould & Curry is being pushed slowly ahead. Fair progress is being made in the joint west crossdrift on the 600-foot Best & Belcher level. They are in now over 210 feet. In the west crossdrift 200-foot Chollar level bunches of quartz are run into. They are crossdrifting to the west on the 500 foot level. The formation is unchanged. On the 3000-foot level they are saving each day a few tons of fair ore. They are pushing ahead in Potosi the south drift on the 600-foot level. Low grade ore is being encountered. In Occidental they are crossdrifting on the 550-foot level and also on the 650-foot level. In the latter the material is soft and shows proximity to the east ledge. On the 750-foot level they have extended the main south drift 700 feet. The face is in fair grade ore. At the end of the drift they are sinking on ore assaying about $56 to the ton.

The following illustrates the changes of the week:

Mines.	Jan. 20.	Feb. 3.
Alpha		
Alta Consolidated		$ 16
Andes	$ 14	
Belcher	39	
Best & Belcher		44
Bodie		
Bullion	09	10
Challenge		
Chollar	27	30
Confidence		
Consolidated California and Virginia		96
Consolidated New York		
Crown Point	29	
Exchequer		
Gould & Curry	34	31
Hale & Norcross		1 65
Justice		
Mexican	22	22
Ophir	58	52
Overman	09	08
Potosi		26
Savage		14
Sierra Nevada	55	1 00
Union	37	43
Utah		
Yellow Jacket	32	

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delin'q't and Sale.	Secretary.
Alpha Con M & M Co, Nev	20	5c	Feb 1	Mar 8 Mar 29	C E Elliot, 309 Montgomery
Baltiol G M Co, Cal	2	30c	Jan 26	Mar 4 Mar 28	R L Cheney, Mills Building
Bullion M Co, Nev	51	5c	Dec 17	Jan 21 Feb 12	R R Grayson, 331 Pine
Challenge Con M Co, Nev	24	10c	Dec 16	Jan 19 Feb 9	C L McCoy, Mills Building
Chollar M Co, Nev	45	20c	Jan 8	Feb 11 Mar 3	C E Elliot, 309 Montgomery
Fall River Con G Q Co, Cal	11	5c	Jan 15	Feb 25 Apr 21	A Lorsbach, 313-315 Front
Marina Marsicano G M Co, Cal	12	9c	Jan 3	Feb 7 Feb 28	Chas Bovone, 217 Sacramento
Mexican G & S M Co, Nev	58	15c	Jan 6	Feb 10 Mar 3	Chas E Elliot, 309 Montgomery
Orleans M Co, Cal	7	10c	Feb 1	Mar 8 Mar 28	Geo O Thurston, 575 Mission
Overman S M Co, Nev	79	5c	Jan 26	Mar 2 Mar 23	G D Edwards, 414 California
Red Cap M Co, Cal	2	$5	Nov 29	Jan 6 Feb 26	H H Martin, 125 Beale
Savage M Co, Nev	94	20c	Jan 6	Feb 8 Feb 28	E B Holmes, 309 Montgomery
Sierra Nevada S M Co, Nev	114	20c	Jan 19	Feb 23 Mar 14	E L Parker, 309 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19	Feb 26 Mar 21	A F Frey, Phelan Building

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 3, 1897.

9:30 A. M. SESSION.

300 Best & Belcher	44	200 Gould & Curry	31
100 Bullion	08	100 Ophir	52
400 Chollar	30	400 Potosi	26
100 Con Cal & Va	96	200 Sierra Nevada	1 00
500 Con Imperial	01	200 Union	43

SECOND SESSION—2:30 P. M.

200 Ophir	51	300 Bullion	10
100 Mexican	22	300 Overman	08
200 Con Cal & Va	94	100 Union	43
100 Savage	14	200 Alta	16
100 H. & N	1 65	300 Caledonia	19
400 Sierra Nevada	1 00		

Rainfall and Temperature.

The following data for the week ending 5 A. M., February 2, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

California Stations.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Minimum Temperature for the Week.	Maximum Temperature for the Week.
Eureka	.18	18.86	26 24	25.07	34	64
Red Bluff	.62	7.32	15.94	15.35	30	60
Sacramento	.26	5 62	11.55	11.68	30	58
San Francisco	.20	5 39	14 64	13.95	37	57
Fresno	.01	2.30	7.18	5.71	28	70
San Luis Obispo	.10	2.96	14.64		34	74
Los Angeles	.02	3.77	11.00	9 35	32	70
San Diego	.12	3.32	7.79	4.40	36	64
Yuma	.16	1.26	4.81	2 22	36	68

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Money loaned mines.

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Assessment Notices.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 3rd day of January 1898 an assessment (No. 12) of 5 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin to the secretary at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

THE SAVAGE MINING COMPANY.—LOCATION of principal place of business San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 6th day of January, 1898, an assessment (No. 94) of 20 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of February, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

FALL RIVER CONSOLIDATED GOLD QUARTZ Company.—Location of principal place of business, San Francisco, California; location of works, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 15th day of January, 1898, an assessment (No. 11) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 313-315 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on THURSDAY, the 21st day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. LORSBACH, Secretary.

Office—313-315 Front street, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

BALIOL GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1898, an assessment (No. 2) of 30 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of March, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Mills building, room 7, fifth floor, San Francisco, California.

THE ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley Mining District, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1898, an assessment (No. 7, new series) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 575 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. O. THURSTON, Secretary.

Office—No. 575 Mission street, San Francisco, California.

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—IN THE—

Western States and Territories.

By R. S. Morrison and E. D. DeSoto. Ninth edition; revised and enlarged; 497 pages, 16mo. Price, postpaid, $3.00. The BANCROFT-WHITNEY CO., successors to the Chain & Hardy Co., Denver, Colo.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from O. M. Henry, in the Murphy Diggings, near Volcano, Amador Co., to deposit tailings in Rancheria Creek; from Geo. A. Hamilton, in the Clapboard Gulch Mine, near Volcano, Amador Co., to deposit tailings in Sutter Creek; from Frank J. Goyan, in the Cox Mine, near Plymouth, El Dorado Co., to deposit tailings in a ravine; from J. M. Longnecker, in the Hull Placer Mine, near Genesee, Plumas Co., to deposit tailings in a ravine; and from E. Becker and Robert Hickey, in the Homestake Mine, near Amador City, Amador Co., to deposit tailings in Rancheria Creek, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on February 7, 1898, at 1:30 P. M.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Humboldt County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 2) levied on the 25th day of November, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Harvey M. Binckley	2	1	5 00
Alice E. Binckley	20	4	20 00
Alice E. Binckley	23	20	100 00
Alice E. Binckley	24	20	100 00
Alice E. Binckley	25	20	100 00
Alice E. Binckley	26	20	100 00
Alice E. Binckley	39	1	5 00
Alice E. Binckley	40	2	10 00
Caroline S. Townsend	18	20	100 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the corporation, 125 Beale street, San Francisco, California, on SATURDAY, the 29th day of January, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the day of sale of the above delinquent stock has been postponed to SATURDAY, February 26th, 1898, at the same hour and place.

H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

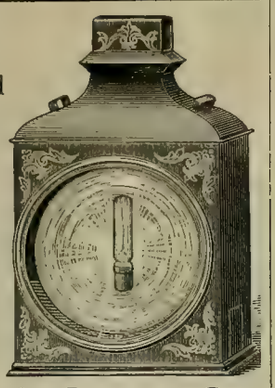
DIVIDEND NOTICE.

JAMISON MINING COMPANY, Rooms 50 and 54, 120 Sutter St., San Francisco, Cal., January 25th, 1898.

DIVIDEND NUMBER ONE.—At their meeting of January 25th, 1898, it was resolved by the Board of Directors of the Jamison Mining Company to pay to the Stockholders of the Company from the surplus funds in the treasury, a dividend of Nineteen Thousand Five Hundred Dollars ($19,500), being Five Cents (5 cts.) per share on the capital stock of the Company. The dividend will be payable at the office of the Company on the Fifteenth (15th) day of February, 1898, to all stockholders of record on the Fifth (5th) day of February, 1898. Transfer books will be closed at the close of business on the 5th of February and reopened on the morning of February 16, 1898.

SAM. W. CHEYNEY, Secretary.

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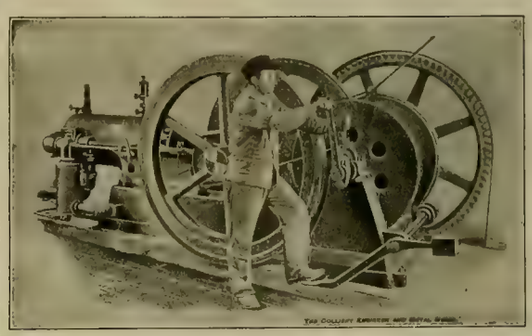
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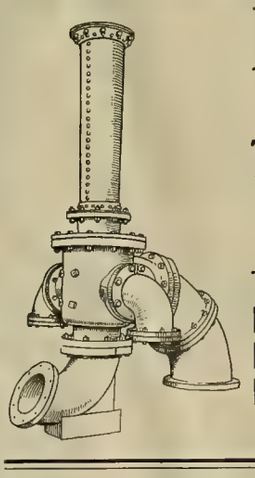
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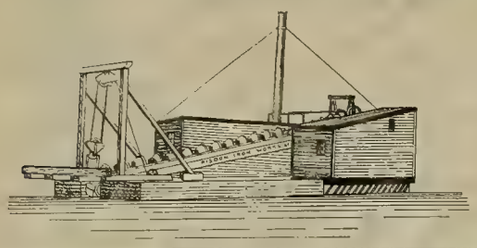
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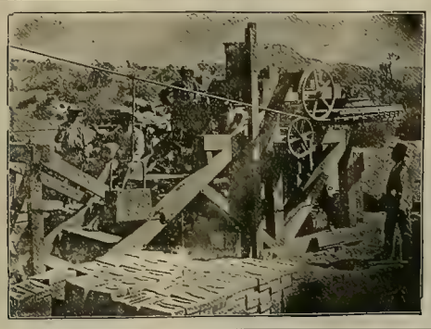
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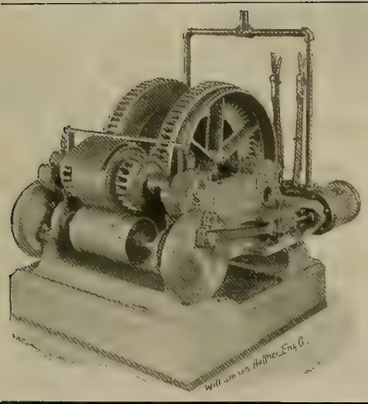
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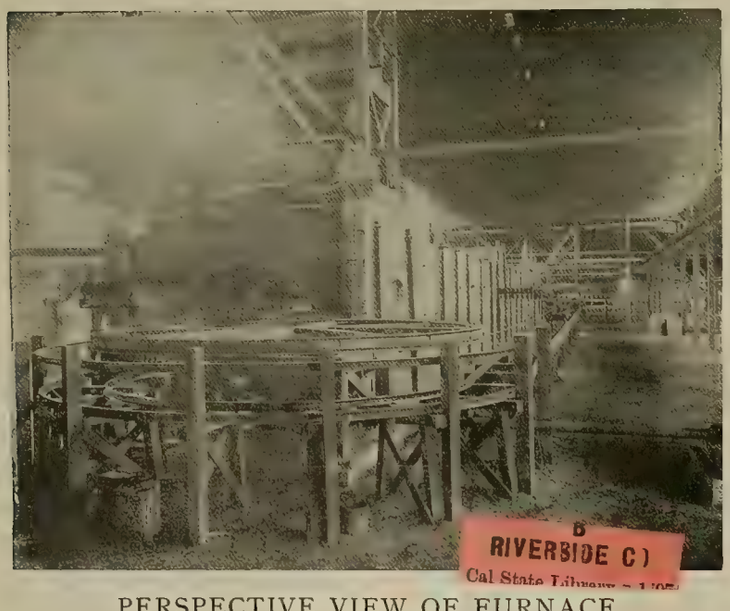
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Extracts from Letters Received from Mr. Philip Hall, Manager the Metallic Extraction Co., Cyanide, Colo.:

January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 100 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.
"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The **ROPP FURNACE** is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal. (two furnaces); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); Broken Hill Proprietary Co., Broken Hill, New South Wales (four furnaces); Puget Sound Reduction Co., Everett, Washington; Colorado Ore Sampling & Reduction Co., Cripple Creek, Colo.; Consolidated Kansas City Smelting & Refining Co., for the Arkansas Valley Smelting Works, Leadville, Colo.; Robert Lanyon's Son's Ore Co., Iola, Kansas (two furnaces); Mountain Copper Co., Ltd., Keswick, Cal.

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AND PACIFIC ELECTRICAL REVIEW.

No. 1962.—VOLUME LXXVI. Number 7. SAN FRANCISCO, SATURDAY, FEBRUARY 12, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Jamison Mining Company.

The property of the above company is in Quartz township, Plumas county, Cal., and consists of 590 acres—430 acres held under patent as quartz and placer claims, and 160 by location as a placer claim. The property adjoins the old and famous Plumas Eureka property of the Sierra Buttes Mining Company, Jamison creek being in a general way the dividing boundary between the two properties. There is an excellent water power belonging to the company. This consists of four lakes, at an altitude varying from 6000 to 7000 feet, and all naturally discharging through one small lake. All of these lakes have been dammed, the main reservoir dam being at the lake through which the others discharge. From there a ditch 1½ miles long carries a large head of water to the pipe line, which discharges at the hoist under a head of 460 feet and at the mill under a head of 525 feet. In all, seven water wheels are used—running the hoist, compressor, mill, electric light dynamo, rock crusher and a train of light shafting, carrying circular saw, drill press, grindstone, etc. The mine is opened by means of a drain tunnel at the lowest practicable level, but this tunnel (and the levels above it) are connected with the surface by a vertical shaft, and everything, waste and ore, is hoisted to the surface through this shaft, it being found cheaper, with the free water power, to hoist than to tram out the length of the long drain tunnel (about 1700 feet from the shaft to the outlet).



PLANT OF THE JAMISON MINING CO., JOHNSVILLE, PLUMAS COUNTY, CAL.

A 10-stamp mill began operation December 26th, 1896. In June, 1897, the erection of ten additional stamps was begun, and the twenty stamps dropped on ore August 26th, 1897. Since then these twenty stamps have run continuously. During the latter four months three 6-foot concentrators were added to the mill, which are found sufficient to handle the tailings. The capacity of the mill is not great, although the stamps are of the most modern description and heavy (one battery being about 900 and the other 975 pounds), owing to the clayey character of the ore. The best monthly capacity obtained from the twenty stamps has been about 1400 tons, crushing through a 40-mesh wire or a No. 0 punched tin screen. During the four months from August 26th, 1897, to December 26th, 1897, the twenty stamps crushed 4917 tons of quartz. The total expense of handling this ore was $12,096.65—$2.46 per ton. This includes everything, office expenses, taxes, insurance, etc. The division of this expense is: Mining, $1.423 per ton; milling, $0.568 per ton; general expense and superintendence, $0.300 per ton; maintenance, repairs and sundry expenses, $0.114 per ton; San Francisco office expense, $0.055 per ton.

The ore worked at present averages an extraction in free gold of from $4.25 to $4.75 per ton. The tailings from the plates run from $1.40 to $1.80 per ton. Of this, about 50 to 80 cents per ton is recovered by the concentrators. The tailings from the concentrators at present going to waste assay about $1 per ton. The company owning this property is organized under the laws of this State, with its principal place of business in San Francisco. A majority of the stock is owned by residents of Pennsylvania and Connecticut. The management of the property, since serious work on it was begun, has been in the hands of Sam. W. Cheyney of San Francisco, assisted for some time past by Geo. S. Redstreake.

The output of the property during 1897 was somewhat in excess of $60,000, the profits for the same period over and above current expenses being about $25,000.

The following will be interesting to miners as showing the relative cost in this case of running ten stamps and twenty stamps:

COMPARISON OF CURRENT COSTS PER TON, OPERATING WITH TEN STAMPS AND OPERATING WITH TWENTY STAMPS.

TEN STAMPS' RUN—FROM JANUARY 1ST TO AUGUST 31ST, 1897. MILLED 5,589 TONS OF QUARTZ.

Current Expenses.		*Per Ton.*
Mining	$13,145 67	$2 352
Milling	4,626 57	0 828
General expense and superintendence	3,249 17	0 581
Maintenance, repairs and sundry expenses	569 82	0 102
Total expense at mine	$21,591 23	$3 863
Add San Francisco office expense	$1,154 70	
Taxes for eight months	112 67	
	1,267 37	0 227
Total cost per ton, ten stamps		$4 09

TWENTY STAMPS' RUN—FROM SEPTEMBER 1ST TO DECEMBER 31ST, 1897. MILLED 4,917 TONS OF QUARTZ.

Current Expenses.		*Per Ton.*
Mining	$ 6,994 51	$1 423
Milling	2,792 17	0 568
General expense and superintendence	1,478 44	0 300
Maintenance, repairs and sundry expenses	561 20	0 114
Total expense at mine	$11,826 32	$2 405
Add San Francisco office expense	$ 214 00	
Taxes for four months	56 33	
	270 33	0 055
Total cost per ton, twenty stamps		$2 46

This may be styled a typical California mining company—nothing very extensive, but deemed worthy of notice as fairly illustrative of what may be considered a legitimate mining proposition. It has been stated in these columns on several occasions that gold ore in this State is being mined and milled at a total cost of less than 60 cents per ton, which is a fact—but, it must be said, under exceptional conditions. The Jamison Company, to which reference is herein made, does not operate under such favorable auspices; yet it is cited as an exponent of what may be said to be a fair example of the workings of a California gold mine. There are hundreds of such properties in this State—some doing better, some perhaps, not doing so well.

The point deemed worthy of mention is the fact that this business of gold mining is more than ordinarily profitable. Here we have a going concern which has cost $150,000. During the past year it cost $60,000 to run it, and on this basis has paid a clear profit of $25,000, being 16⅔ per cent on the investment. Keeping out of consideration the fact that there are a great many mining properties in California doing better, yet it is believed that the contrast between this and other forms of business strikingly illustrates the profitable character of such work when entirely separated from its speculative aspect. This exemplifies California's greatest industry, which is in direct contrast to the greatest industry of New England, which is the manufacture of cotton fabrics, and where, so the papers tell us, now exist hard times, prices below cost, mills running on short time, stocks accumulating in the warehouses, and refusing to move goods at prices that will return a new dollar for an old one, a cut in wages, strikes, suffering, misery, destitution, and all the untoward accompaniments of such a deplorable state of affairs.

The owners of the New England mills would be pleased with a profit of 3 per cent. They have to watch markets and cut everything down to the quick, reduce expenses, stop operations, compete with jealous rivals, while the California gold miner knows that in place of having to strike a customer the customer is after him, and that, whether he produces 100 ounces or 1,000,000 ounces, he is sure of getting $20.67 for every ounce of it; and he cares little whether Colorado, Utah, Montana or any other State produces as much or more gold than he, as there is a constant demand for all the gold that can be produced at a fixed price. Gold is the one present product of man's labor which cannot be controlled in output nor have its value determined according to the laws of supply and demand that control every other product.

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J. F. HALLORAN.....General Manager

San Francisco, February 12, 1898.

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PROMINENT among the county exhibits at the Golden Jubilee Mining Fair are those of Placer and El Dorado counties.

EXACT statistics of the gold production for '97 of California and Colorado have not yet been received, though it is apparent that our sister State will crowd California pretty close for first place as a present gold producer.

"ON TO THE KLONDIKE" has taken the form of a stampede. Hundreds are now leaving San Francisco and other coast ports, lured by the reports from that region. Just what the majority of them propose to do when they get there is a problem. The whole thing is a fever that must run its course, and it is to be hoped that most of the sufferers will be discharged cured.

AUSTRALIA'S gold yield for '97 was something phenomenal—almost equaling that of the United States. About 25% of the amount has been received in San Francisco during the past few months to settle the balance of trade in favor of this country. The £515,857, equal to $2,510,160, on the steamship Mariposa yesterday brings the total shipment of Australian gold to California for the season up to $13,000,000.

THE MINING AND SCIENTIFIC PRESS is appealed to as to whether the Klondike placers are richer than those of California were. Exact data shows that the most extravagant stories as to the yield and richness of Klondike placers are discounted and overshadowed by the actual record of the yield of California's placer mines. J. Ross Browne's "Report to the Government on the Mineral Resources of the Pacific States," in 1867, a sober, authentic official report from a conservative mining expert and statistician, shows that nothing yet reported from the Yukon region exceeds, or more than approximates, the richness of the early California placers. Much of what is reported from the Yukon is idle hearsay or emanates from the transportation companies. What is set down in the Government report referred to is not conjecture nor stated to influence travel, but is an authentic record of fact. There are many trustworthy records of the almost incredible yield of California's placers, but the above is referred to as being in the writer's remembrance. For instance, the Rhodes claim, near Murphys, Calaveras Co., produced $250,000 from an area 100 feet long and 40 wide; ninety pounds of gold were taken out in twenty-four hours. The Jamieson claim, Iowa Hill, Placer Co., yielded $500,000; the Dardanelles, Forest Hill, in the same county, $2,000,000; near Springfield, Tuolumne Co., single carloads of "pay dirt" panned out $1000 each. Butte, Yuba, Nevada and other counties have equally as good records. In the case of California it is not what its placers are "going" to yield that is the subject, but what has gone to swell the world's store of gold.

"Unawed by Influence and Unbribed by Gain."

In the issue of the 8th ult., commenting on one of those ridiculous romances called a "mining prospectus" issued by a London company to float a California gold property, the editorial statement was made that that prospectus "is appearing as a page advertisement in every English newspaper that is feared." Some objection has been received from severely virtuous critics, who solemnly protest against the implication that any part of the British press can be influenced by sordid motives. This paper can usually prove what it asserts; in this case the fact that some of the British press is purchasable is so notorious as to need no proof. It is an acknowledged fact, unquestioned except by those who pretend ignorance of it. There are British editors who have the same rule as that which governs the management of this paper, viz., that neither money nor influence can put anything in or keep anything out of its columns. Prominent among these unpurchasable men is Labouchere, the editor of *Truth*. On this very subject, for casual reference to which Pharisaical critics undertake to censure this paper, Labouchere in his fearless paper, published in London, says editorially:

I am told by a gentleman who speaks with some authority that there are about twenty newspapers in London alone which have to be "squared" with advertisements whenever a new company is floated, under threats of hostile criticism unless this precaution is adopted. The author of this statement does not offer me any evidence so far as London is concerned, but he forwards some instructive correspondence between the directors of a new company and a newspaper published at Perth.

The correspondence is opened by the editor of the paper, who writes to the managing director to say that he received an important letter challenging the statements in the company's prospectus, and generally making unfavorable observations upon the enterprise.

"If we publish this letter on Monday," he says, "you need not look for any Scotch applications for stock. That is clear."

He goes on to say that there is plenty of time for the company to wire if "they have anything to say," and that "it might be possible to allow the letter to stand over a few days until the charges have been verified," but that the letter will "be published if we do not hear from you by Monday afternoon." Then comes this very significant paragraph: "Also please say if we shall insert the prospectus on Monday."

The directors sent their prospectus for insertion as an advertisement, and at the same time, strange to relate, the significance of the "important letter" so far evaporated that in the next communication the editor states: "We have held over the letter to which we called your attention—in fact we do not think we will insert it at all."

How surprised our critics will be to learn that there is such a man as the editor of the newspaper referred to in Perth!

NOTICEABLE at the Golden Jubilee Mining Fair now in progress at Mechanics' Pavilion in San Francisco, is the unostentatious, matter-of-course manner in which casual evidence is given mineral wealth. In the display of the Selby Smelting and Lead Company of San Francisco, for instance, is a large gilded block on which is inscribed the brief statement that that represents the size of the refined gold product of that concern for the year 1897, value $19,600,000. Nothing is said of the silver, copper, etc., merely the gold, and no especial wonder is made of that; nearly $20,000,000 in fine gold in that one establishment in a year. In a modest little corner of the State Mining Bureau exhibit is a reproduction in size and appearance of a bar of gold, the product of one clean-up of the North Bloomfield mine, with the simple announcement in small letters on a little card of the fact and the statement that it was of the value of $114,000. On the ground floor, among the gold exhibits, are gold bricks of the value of $22,000 each. There is no attempt at special prominence in any of these exhibits. Like the climate or the facilities of operation, these things in California are taken as matters of course. Many of the mines from which this gold came can be reached in a palace car from San Francisco, and work thereon can be done any and every day in the year. Were it to require a vexatious and expensive journey, full of hardships and privations, accompanied with appalling danger and possible death in a region of eternal ice and semi-night, these would be great things; but in this favored land they are of little wonder to those familiar with them. It is in order, and should be provided for, to send the major part of the exhibit of gold and ores, etc., now in this city, to the Omaha Exposition next summer; thence to New York City, then to Paris in 1900. Every thousand dollars so expended would bring back a million dollars to the State and the coast. This is the age of advertising, whether it be food, mining machinery, mines, or anything else. California's nuts, oranges, grapes, wines, etc., have been well advertised during recent years; but until lately there has been but little effort to have California's mineral wealth understood abroad. Californians go largely on the assumption that, as they know about it and appreciate it, why of course the world must know it, too. Without the slightest bombast or efforts to boom, a modest exhibition of exact facts wherever large numbers of people congregate would be a good advertisement for the mineral resources of this commonwealth.

AN editorial in the issue of December 25th, '97, entitled "The Modern Alchemists," has elicited a more than ordinarily large number of comments, and the editorial office could supply sufficient material for one issue, to the exclusion of everything else, were a portion of the received manuscripts on that subject published. The letters received, taking that editorial as a text, illustrate forcibly two things: First, the interest evinced in the alleged manufacture of gold, which is not surprising; and, second, the surprising evasion or forgetfulness of the main point exhibited by many of the letter writers in assuming that the question at issue is the sincerity of the alleged gold manufacturers. No one doubts the sincerity of their convictions; but there is something more required than merely sincerity or honesty of purpose. Probably none are more sincere than the gentleman in the insane asylum at Stockton who imagines himself the owner of the State, or the wave motor man who seeks to ignore the law that action and reaction are equal. These people are as honest in their beliefs and as sincere in their convictions as the gentlemen who assert their ability to manufacture gold at will from silver, iron, sulphur, etc. The touchstone of all these things is success. The world doesn't care particularly by what means success is attained. The article to which these numerous replies have been received did not impugn the honesty or sincerity of the devotees of the new-old science of alchemy. On the contrary, it asserted in the most positive terms its belief that they were sincere. The whole matter is one that does not require, nor, indeed, admit of, argument. These gold manufacturers make certain claims, and it would seem as though the result would demonstrate the accuracy or absurdity of their statements. It is unnecessary to attempt any discussion, for if they can do what they claim, such result would be the best commendation of their theories. They all assume a disregard for ordinary curiosity, which is the main impulse of the public mind. As in religion people prefer to be amused rather than admonished, so in science the general public prefers to have its curiosity excited rather than to be instructed. In common with other things, this matter possesses some interest to the public, and will doubtless be discussed by lofty minds in after ages, when all now living, like streaks of morning cloud, shall have melted into the illimitable azure of eternity.

IN the issue of Dec. 25th, '97, as it left our mailing office was folded in each copy a fine map of the Klondike and Yukon region, and a brief announcement was made of the fact. Many of our subscribers, for some reason, did not find this map in their copies as received, and so notify us. In all cases of such notification an additional map has been sent, and if those who were equally unfortunate in this regard will send a postal to the business office, stating the fact, a copy of the map will be sent to the designated address.

Useful Hydraulic Data.

Written for the MINING AND SCIENTIFIC PRESS by JNO. W. GRAY.

The following information (somewhat condensed) is taken from a paper published in the New Zealand Mines' report, and written by Mr. Alex. Aitken, manager of the Government water races at Kumara, the largest hydraulic sluicing gold field in New Zealand. The matter given is instructive and will prove of value to those engaged in hydraulic mining, or using water for power and other purposes.

Experiments were carried out to verify the rules and data given, which are simple and easily understood. During a professional visit to New Zealand last year I saw much to interest me in the hydraulic sluicing regions of the West Coast, and the data copied from Mr. Aitken's paper will no doubt prove of interest to many, as showing how matters connected with the practical working of the mines are there determined.

Power of Water.—A sluice head of water is a constant flow of 1 cubic foot per second, equal to 40 miners' inches of 1.5 cubic feet per minute. The following method of estimating the practical horse power of water is based on the fact that one sluice head of water falling 8.8 feet is equal to one theoretical horse power.

TABLE No. 1.

PERCENTAGE OF THEORETICAL HORSE POWER REALIZED BY VARIOUS MOTORS.

Undershot wheels	30% to 35%
Low-breast wheels	50% to 55%
High-breast wheels	55% to 60%
Overshot wheels	60% to 65%
Turbine wheels	60% to 70%
Pelton wheels	80% to 90%
Water pressure engines	70% to 80%

In the above table the percentage of the power developed has been ascertained by actual experiments and varies within the limits given, according to manner of construction. To obtain highest efficiencies, motors should be properly suited to water used. The manner in which water is applied, and the regulation of proper speed, are of the utmost importance. The correct speed of a Pelton wheel is one-half the speed of water issuing from the nozzle. The high efficiency of this wheel is due to the perfect manner of reversing the direction of the water discharged upon it.

The following table gives the hydraulic head necessary to obtain one effective horse power from one sluice head of water. The hydraulic head is the total vertical height of supply, after making deductions for losses by friction and other retarding forces. To use the table, multiply sluice heads of water by the hydraulic head and divide by the number in "division" column opposite the given efficiency:

TABLE No. 2.

DIVISIONS OF HYDRAULIC HEAD FOR ASCERTAINING EFFECTIVE HORSE POWER PER SLUICE HEAD OF WATER.

(Calculated from $\frac{8.8}{\text{percentage}}$ = head required per horse power.)

Efficiency of motor—Per cent.	Division.	Efficiency of motor—Per cent.	Division	Efficiency of motor—Per cent.	Division.
100	8.800	76	11.578	52	16.923
99	8.888	75	11.733	51	17.254
98	8.979	74	11.891	50	17.600
97	8.072	73	12.054	49	17.959
96	9.166	72	12.222	48	18.333
95	9.263	71	12.394	47	18.723
94	9.361	70	12.571	46	19.130
93	9.462	69	12.753	45	19.555
92	9.565	68	12.941	44	20.000
91	9.670	67	13.134	43	20.465
90	9.777	66	13.333	42	20.952
89	9.887	65	13.538	41	21.463
88	10.000	64	13.750	40	22.000
87	10.115	63	13.968	39	22.564
86	10.232	62	14.193	38	23.157
85	10.352	61	14.426	37	23.783
84	10.476	60	14.666	36	24.444
83	10.602	59	14.915	35	25.142
82	10.731	58	15.172	34	25.882
81	10.864	57	15.438	33	26.666
80	11.000	56	15.714	32	27.500
79	11.139	55	16.000	31	28.387
78	11.282	54	16.296	30	29.333
77	11.482	53	16.603		

Example.—Determine the actual H. P. given by a low-breast wheel, efficiency 55%, with 33⅓ sluice heads of water, and 10 feet hydraulic head: $\frac{33\frac{1}{3}\times 10}{16}$ = 20.8 H. P.

If the pipes are large enough to convey the water at a velocity not greater than one foot per second, and length of pipe line is not great, no allowance for friction is necessary, and the total head may be taken as the hydraulic head. If the pipes are small, and the velocity of water greater, proper allowance must be made for friction. For determining loss by friction, see instructions and table given below.

Pipes conveying water for power cannot be too large; the limit is simply practicability and cost. With small pipes and long lines, much of the total head is absorbed by friction and lost.

Friction of Water in Pipes and Channels.—The hydraulic mean depth is the sectional area multiplied by the wetted border. Experiments show that the forces retarding the flow of water in pipes and channels, generally termed "friction," are, in pipes and channels of the same character and of equal hydraulic mean depth, proportional to the square of the velocity of the water; but where the H. M. D. is greater, the loss of head by friction is less for any specified velocity.

In the flow of water through pipes and channels, a portion of the head is absorbed in producing the velocity; another portion is absorbed by friction proper and another portion (in many instances very large) is absorbed by eddies and counter currents, caused by obstructions, inequalities and roughness in the pipe or channel. The last-named loss of head may be seen by observing the flow of water in an unlined tunnel or open ditch, with sets of timbers every three or four feet. Experiment has shown that such a tunnel or channel may be made to carry double the quantity of water if smoothly and uniformly lined. A change in the form of sectional area of flowing water produces retardation.

There are several methods for ascertaining the loss by friction (which term is taken to include all the retarding forces) in pipes of various diameters, and carrying water at various velocities. A pressure gauge may be used at any point in a line of pipes, and the difference between the reading when the water is at rest and when the water is in motion delivering a certain quantity of water (the pipes being full in both instances) is the exact measure of the loss of head that takes place between the source and the point at which the gauge is used.

Another method quite as reliable is the calculation of the loss of head from the carrying capacity of pipes of various diameters under various hydraulic gradients. If a pipe of a specified diameter (or H. M. D.) carries a certain quantity of water on a certain gradient, then that gradient is the correct measure of the loss of head of that pipe when carrying that quantity of water. If a pipe carries four sluice heads of water on a grade of 1 in 100, then the loss of head in that pipe, carrying that quantity of water, will be 1 foot for every 100 feet of length. Therefore, a formula for ascertaining the carrying capacity of pipes of various diameters under various gradients can, by transportation, be made to give the correct loss of head by friction.

Table number four below gives the results of experiments made to ascertain which formula in general use gives the most correct results. It will be seen that Eytelwein's general formula is not only the most correct but by far the most simple, and is applicable not only to pipes but to channels as well. The formula is: "The mean velocity of water in feet per second is equal to the square root of" (twice the fall in feet per mile multiplied by the hydraulic mean depth). This formula may be stated as $\sqrt{R. S. 10560}$ = velocity, R being the hydraulic mean depth and S the sine of inclination, S10560 being equal to twice the fall in feet per mile. The formula is correct only for long, straight and smooth pipes and channels, but it gives correct proportions for pipes or channels of any kind—crooked or straight, rough or smooth—and the results, multiplied by suitable coefficients, give ultimate results quite as correct as the more complex methods of calculation.

TABLE No. 3.

LENGTH OF PIPE (IN FEET) IN WHICH 1 FT. OF HEAD IS ABSORBED BY FRICTION IN PIPES FROM 6 INS. TO 36 INS. IN DIAMETER WHEN CARRYING FROM ONE TO FIFTEEN SLUICE HEADS OF WATER.

(Calculated from $\frac{R\ 10560}{V^2}$ = Length for 1 Ft. of Head.)

Diameter in Inches	One Head.	Two Heads.	Three Heads.	Four Heads.	Five Heads.	Six Heads.	Seven Heads.	Eight Heads.	Nine Heads.	Ten Heads.	Eleven Heads.	Twelve Heads.	Thirteen Heads.	Fourteen Heads.	Fifteen Heads.
6	51	12.7	5.6	3.1	2	....	....	....	....	....	....	....	....	....	....
7	110	27.5	12.2	6.9	4.4	3	2.2	....	....	....	....	....	....	....	....
8	214	53.5	23.7	13.4	8.5	5.9	4.3	3.3	2.6	2.1	....	....	....	....	....
9	386	96.5	42.9	24.1	15.4	10.7	7.8	6	4.7	3.8	3.2	2.6	2.2	....	....
10	651	163	72	40.7	26	18	13	10.1	8	6.5	5.4	4.5	3.8	3.3	2.9
11	1,051	263	117	65	42	29	21	16	13	10.5	8.7	7.3	6.2	5.3	4.6
12	1,628	407	180	101	65	45	33	25	20	16	13	11	9.6	8.3	7.2
13	2,430	607	270	151	97	67	49	37	30	24	20	16	14	12	10.8
14	3,510	870	391	219	140	97	71	54	43	35	29	24	20	17	15
15	4,960	1,242	552	310	198	138	101	77	61	49	41	34	29	25	22
16	6,862	1,715	762	428	274	190	140	107	84	68	56	47	40	35	30
17	9,292	2,323	1,032	580	371	258	189	145	114	92	76	64	55	47	41
18	12,366	3,091	1,374	773	495	344	252	193	152	123	102	86	73	63	55
20	20,943	5,235	2,327	1,308	837	581	427	327	258	209	173	145	124	106	93
22	33,729	8,432	3,747	2,108	1,349	936	688	527	416	337	279	234	199	172	149
24	52,112	13,028	5,790	3,257	2,084	1,447	1,063	814	643	521	430	361	308	265	231
26	77,760	19,440	8,640	4,860	3,110	2,160	1,587	1,215	960	777	642	540	460	396	345
28	112,630	28,157	12,514	7,039	4,505	3,128	2,298	1,759	1,390	1,126	930	782	666	574	500
30	159,040	39,760	17,671	9,940	6,362	4,418	3,246	2,485	1,963	1,590	1,314	1 104	941	811	707
32	219,620	54,905	24,402	13,726	8,785	6,100	4,482	3,431	2 711	2,196	1,815	1,525	1 299	1,120	976
34	297,370	74,342	33,041	18,585	11,895	8,260	6,068	4,646	3,671	2,973	2,457	2,065	1,759	1,517	1,321
36	395,730	98,932	43,970	24,733	15,829	10,992	8,076	6,183	4,886	3,957	3,270	2,748	2,341	2,019	1,758

TABLE No. 4.

TABULATED STATEMENT OF EXPERIMENTS ON THE CARRYING CAPACITY OF CLEAN PIPES OF VARIOUS DIAMETERS UNDER DIFFERENT HEADS CARRIED OUT ON THE WAIMEA-KUMARA WATER RACES.

Diameter of Pipe.	Kind of Pipe.	Total Length.	Total Head.	Hydraulic Gradient.	Actual Quantity of Water Discharged.	Calculated from Neville's Formula: $V=140\sqrt{\frac{R}{n^2}}S-\frac{1}{n^2}RS$	Calculated from Eytelwein's Formula: $V=\sqrt{R\ S\ 10560}$
		Feet.	Feet.		Cubic Feet per second.	Cubic Feet per second.	Cubic Feet per second.
30 inches	Wrought iron, riveted.	1,188	4.46	1 in 266	24	25.9187	24 269
24 "	" "	16,335	28.92	1 in 57	22	24 4003	21.767
18 "	" "	2,514	32.73	1 in 77	12.5	13 9885	12.689
30 "	" "	943.8	1.18	1 in 800	14	14 2310	14.099
30 "	" "	943.8	1.65	1 in 572	16.75	17 1546	16.673
30 "	" "	943.8	1.51	1 in 625	16	16 3325	15 953
36 "	Cast iron	11,136	4	1 in 2,781	12	11.2204	11.922
36 "	"	11,821	24	1 in 484	28.75	29.9566	28.593
30 "	"	11,213	11	1 in 1,019	19.75	19 8111	19.703
36 "	"	11,975	35	1 in 333	.....	36 832	34.520
4.44 "	Galvanized iron	1 254	12	1 in 105	0.329	.....	0.321

Table No. 3 is founded on Eytelwein's formula. It gives the length of pipe in which 1 foot of head is absorbed by friction in clean pipes from 6 inches to 36 inches in diameter, when carrying from one to fifteen sluice heads of water. To use the table, divide the total given length of pipe by the length in the table corresponding to loss of 1 foot of head; the answer is in feet.

If the quantity of water intended to be used is more than fifteen sluice heads, take from the table the number corresponding to one-half, one-third or one-fourth the intended quantity and divide by 4, 9 or 16, respectively; or, use the formula as given at head of table.

When the pipes are slightly rough, add 30 per cent. When pipes are very rough and badly laid, add 60 per cent.

Calculation of the Carrying Capacity of Open Channels, Tunnels and Flumes, by Eytelwein's General Formula.—Mean velocity of water, in feet per second, equals the square root of twice the fall in feet per mile multiplied by the hydraulic mean depth. Velocity multiplied by area equals quantity. Hydraulic mean depth is the sectional area divided by wetted border. Area is mean width of flowing water multiplied by depth. Wetted border for plumb or sloping sides is found as follows:

Plumb Sides	Depth × 2 + width of bottom.
¼ to 1 "	Depth × 2.0615 + width of bottom.
½ to 1 "	Depth × 2.236 + " " "
1 to 1 "	Depth × 2.828 + " " "

The number of cubic feet per second (or sluice-heads) of water which such a channel will carry, if long, straight and smooth, is given by the formula or rule, but for other kinds of channels, as a crooked or rough ditch or tunnel through boulders and stones, or with sets of timber every 3 or 4 feet, the result must be multiplied by a coefficient suitable to the character of the channel. The following table of coefficients is deduced from a large number of experiments, extending over a period of twenty-five years:

Iron fluming, straight and smooth	1.0
Iron fluming, moderately straight and smooth	0.9
Flumes and tunnels, straight and lined with dressed boards	0.8
Flumes and tunnels, straight and lined with sawn boards	0.7
Clay, smooth and moderately straight	0.6
Gravel, moderately rough, with easy curves	0.5
Boulders, or with sets of timber and bad curves	0.4

This is for long lengths, or lengths sufficient to allow the flowing water to acquire its proper train. Short lengths of fluming between tunnels or ditching should in all cases have the same sectional area, and, as near as possible, the same form of flowing water as the tunnels or ditching, and the same gradient. All changes in the form of sectional area of flowing water should be made gradually.

Example.—What quantity of water will a channel in moderately rough gravel with easy curves carry, with sides slopes ½ to 1, 6 feet in width of bottom, 3

feet depth of water, and a gradient of 4 feet per mile? $(3 \times 2.0615) = (6.1845) + 6 = 12.1845$ wetted border.

$$\frac{6 + 7.5}{2} = 6.75 = \text{mean width.}$$

$$6.75 \times 3 = 20.25 = \text{area.}$$

$$\frac{20.25}{12.1845} = 1.6619 \text{ hydraulic mean depth.}$$

$\sqrt{8 \times 1.6619} = 3.646 =$ vel., if feet, per second.
$3.646 \times 20.25 \times 0.5 = 36.91$ sluice-heads of water.

Answer: In flumes, tunnels and channels of similar character, four times the gradient doubles the velocity or quantity, and four times the hydraulic mean depth also doubles the velocity or quantity.

Velocity is proportional to square root of gradient.
" " " " " " " H.M.D.
Velocity is proportional to square root of gradient × H.M.D.

Hydraulic Sluicing: Capacity of Sluices.—In sluices of similar as well as in other channels the velocity of water is proportional to the square root of the hydraulic mean depth multiplied by the gradient. In sluicing at Kumara the widths of the boxes are so regulated in properly worked claims that there is but little variation in the H. M. D. Therefore, in the calculation of the velocity of the water in the sluices at Kumara, or at other places having similar wash, the hydraulic mean depth need not be considered, and the velocity of the water may be stated as proportional to the root of the gradient. As the power (or force) of water is proportional to the quantity (or weight) of the water multiplied by the square of the velocity, and as velocity is proportional to the square root of the gradient, it follows that the power of water is directly proportional to the quantity of water multiplied by the gradient. This is only a modification of the well-known laws of water—the velocity of water is proportional to the square root of the hydraulic head, and the power of water is directly proportional to the quantity of water multiplied by the hydraulic head.

Experiments have shown these laws to be applicable also to gradients of sluices and other open channels; and as the velocity of water from nozzles is proportional to the square root of the hydraulic heads, so velocity of water in sluices having uniform hydraulic mean depth is proportional to the square root of the gradients.

The following rule has been checked by experiments and measurements made at Kumara. The rule gives the quantity (in cubic yards) of ordinary wash sluiced away per hour, in ordinary sluice boxes, paved with wood, with various quantities of water on various gradients. The rule is: The quantity of water in sluice heads multiplied by the fall in inches per box of 12 feet gives the number of cubic yards sluiced away per hour. Example—Ten sluice heads × 6 inches fall per box = 60 yards, the quantity sluiced away per hour. Number of cubic yards per hour required to be sluiced away, divided by the fall per box, gives the quantity of water required for that purpose. The number of cubic yards per hour required to be sluiced away, divided by the number of sluice heads available, gives the required fall per box.

The rule gives close approximate results, provided a proper use is made of the water, and the width of box is in proportion to fall and quantity of water.

The nature of the material to be sluiced must be considered. With material of high specific gravity and large quantities of spawled stones, the quantity put through will be less. With material of low specific gravity, and well-rounded stones, from 6 to 18 inches diameter, the quantity put through will be more. Wash is more easily sluiced when it contains a fair proportion of well-rounded stones. Fine, heavy wash is the most difficult; the stones keep the finer and heavier material from settling.

All the blockages at Kumara are composed of fine, heavy sand, and are seldom or never due to stones. All the material in sluices should be constantly on the move, otherwise blockages will occur, less material will be sluiced away and gold will be lost. As the parties running tailings into the main tail-races or sludge channels at Kumara have to pay a fixed price per shift of three hours for maintenance and repairs, means were devised for regulating the quantity of tailings sluiced by each party into the main sludge channel. As the price per shift was equal, each party was allowed to sluice an equal number of yards into the main tail-race. A table was prepared for the purpose. The table was calculated so that each party would sluice into the main tail-race sixty-four yards per hour, thus equalizing wear and tear and giving each party equal advantage of the flush water, which was supplied free. The table was calculated from the rule: "The number of cubic yards per hour required to be sluiced away, divided by the fall per box in inches, gives the quantity of water required for the purpose. Fall to be reckoned from the total difference of level in 60 lineal feet of tail-race, running full. The rule has been in force for some years and has given general satisfaction. It is in accordance with American authorities on the subject, and produces practically the same results as more complicated methods of calculation.

The regulations for main tail-race, Channel No. 4, are based on each party sluicing in 112 cubic yards of tailings per hour, and the quantity of water is calculated in the same way.

Example.—Water required to sluice into main tail-race 112 cubic yards of material per hour, with fall per box of 7 inches: $\frac{112}{7} = 16$ sluice heads = quantity of water required.

LIST OF CLAIMS AT PRESENT SLUICING ON THE KUMARA GOLD FIELD, SHOWING WIDTH OF BOXES, FALL PER BOX, QUANTITIES OF WATER USED, AND REMARKS ON WORKING.

Number of claims.	Width of box—Inches.	Fall per box—Inches	Quantity of water—Sluice heads.	Remarks.
1	32	4	20	Works well.
1	30	4½	20	Not straight; bad.
1	26	5	12	Fair.
1	22	5	12	Fair.
2	26	6	10	Fair.
2	22	6	10	Fair.
1	22	6½	10	Fair.
1	26	6¾	24	Too narrow.
1	24	7	14	Too narrow.
1	22	7	8	Good.
2	24	8	14	Too narrow.
3	24	8	10	Very good.
2	22	8	8	Fair.
1	22	8	10	Good.
1	20	8	10	Good.
1	20	8	8	Fair.
1	26	9	12	Good.
1	24	10	10	Good.
1	30	12	10	Good.

The total length of private tail-races in use at Kumara is more than seven miles, and quite double that length are now abandoned, as the ground commanded by them has been worked out. Main tail-races in use have a length of about three miles.

Wear of Wood (on End) Blocks.—Red pine (Rimu), being the most plentiful timber in the neighborhood of Kumara, is generally used for paving blocks. Other timber is, however, often used, and white pine will stand longer than red pine,

The following rule gives the life of the wood paving blocks nearly right: The width of the sluice in inches multiplied by the thickness of the blocks in inches multiplied by 320 gives the number of cubic yards of wash that will pass through the sluice before the blocks are worn out.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER IV.

By GEO. F. BECKER.

The famous auriferous Tertiary gravels of California would scarcely be called gravels elsewhere. The pebbles are for the most part as large as cobble-stones, and a good proportion of them reach the size of the largest watermelons. Even the recent stream gravels, such as are being worked in Alaska, are very coarse and much of the material is no smaller than cocoanuts. The great gold-bearing channels in California are not usually over a mile in width, though occasionally they extend to two miles, but only a small part of such masses carries any large quantity of gold per ton. They are worked in part by hydraulicking, the cheapest of processes, and in part by drifting. A drift mine can not be run considerably under $1 per cubic yard, or say 2 shillings per ton. Now, in these great river channels the only portion which will pay for drifting is almost invariably the center of the channel on the bedrock. As a rule, the width of the channel which will pay for drifting is not over 200 feet, although in exceptional cases it extends to 400 feet. Much of the gold in these channels is coarse and nuggets are frequent. Could anything be more unlike the conditions on the Rand, where there is no real bedrock above the Swasi schists, no single surface along which the gold has accumulated, no conglomerate in the Main Reef series with pebbles larger than a goose egg, where there are no nuggets, and where the remunerative ore is known, by actual exploration, to be fairly uniform for a width of some 6000 feet? It may, indeed, be said that richer gravels than those of California might exist. If they did, most of the gold would still be found near the center of the channel and at bedrock, partly in the shape of nuggets, and they would merely resemble the richer portions of the Tertiary river beds of the Sierra Nevada.

The hypothesis of a lacustrine origin for the Lower Cape formation seems to me as untenable as the fluvial suggestion. Lakes are characteristically quiet sheets of water, from which sediments scarcely escape; in fact, they may be called Nature's "slime ponds." Lake beds are usually composed in great part of excessively fine silt, quite comparable to mill slimes. Such beds are not, however, composed exclusively of fine sediments; violent showers, landslides, glaciers, volcanoes and dynamic disturbances introduce coarse material into lakes, which, when worked over, produce fresh-water conglomerates. But these are always, so far as I know, associated with the peculiar fine sediments which are the direct evidence of the absence of strong, persistent currents in the body of water where sedimentation went on. Nothing of this kind is observable on the Rand; on the contrary, a vast proportion of the rocks was originally either conglomerates or sands as coarse and clean as are now formed off shores along which rapid currents flow, carrying away the finer detritus. Unless, too, the banket of Zululand is wholly independent of that of Klerksdorp and Heidelberg, the mere extent of the deposits would preclude any lake to which the name of inland sea would not be more appropriate.

Banket Deposited in East-West Currents.—The vast thickness of the Lower Cape, together with the physical character of the beds, indicates that the material was deposited off a subsiding shore which underwent depression more rapidly at some times than at others. It must always have been subject to currents of considerable strength, and these were probably strongest when the depression was most rapid. The direction of the shore was, roughly speaking, east and west, possibly with off-lying islands, and the direction of the currents must have been from east to west. This is easily proved. It is well known that the present rather vigorous currents of the African coast flow down the east coast, across the Cape, and up the west coast. They flow as nearly in a westerly direction as circumstances permit, and were a broad channel to be formed across Africa in the latitude of Johannesburg the currents would flow through it from the east with greatly increased vigor. The currents must always have had this tendency, for they are due to the direction of the prevailing winds, which again depends upon the direction of the rotation of the earth. A practical result of these conditions is that, other things being equal, the coarsest conglomerates of wide extension must have formed along straight stretches of east-west coast, while in the shelter of bights or promontories finer material would settle. Local accumulations of coarse material might, however, occur where the irregularity of the coast line was such as to give rise to violent eddies.

The above considerations are, of course, independent of the theories of gold deposition, and would apply if there were not a pennyweight of gold in the country. On the Rand, however, there certainly is a relation between the coarseness of the pebbles and the amount of gold, so that on any theory of deposition the distribution of conglomerate is important.

Upheaval and Injection.—The disturbances to which the Lower Cape has been subjected are important and interesting, but by no means fully worked out. It is sometimes assumed that the beds were laid down horizontally. For a small area such an assumption is justifiable enough, but it is quite insufficient, even as a rough approximation, when one is dealing with beds a score of miles, or many score of miles, in length. One has only to recall the beaches of any coast line with which one is familiar to perceive that bights, points, shallows, and deeper basins are almost certain to occur within a dozen miles; while islands as well as coastal sinuosities are of frequent occurrence, particularly in a subsiding area. When such a region is disturbed, bent, and faulted, the final configuration is the resultant of the original irregularities and the induced movements. Along the Witwatersrand proper the coast would seem to have been remarkably straight, and the chief disturbance has been a rather sharp flexure of the northern edge of the series upward. In Deep Levels the dip of the strata is usually between 20° and 30°, while at the croppings 60° is more characteristic, and some of the properties show outcrops which dip nearly vertically, but this is only a local exaggeration of the general tendency. The low range of hills called the Witwatersrand is formed of the upturned edges of the Lower Cape beds. The line of greatest flexure of the beds is, in most cases at any rate, still beneath the surface. The flexure of the beds was accompanied by innumerable fractures attended by small faults. The faults have not as yet been systematically studied, but some of them are normal, some are overthrust; some follow the strike, others the dip. I think there is no doubt that the systematic relations of the principal faults could be elucidated, but much information not recorded on the mine maps would be requisite for a discussion. The indications of the association of normal and abnormal faults are that the pressures acted at a considerable angle to the horizon. The dislocations were accompanied by the injection of the country with large numbers of dikes, which appear to be diabase and related rocks. Between the Lower Cape and the Upper Cape is a sheet of amygdaloidal diabase, which probably escaped through some of these dikes, and both disturbances and intrusions seem to have occurred for the most part before the Upper Cape was deposited, though minor disturbances certainly occurred at a later period.

It is desirable, from an economic point of view, to observe the evident deduction that the present croppings of the reefs are not at all likely to represent the beds at a uniform distance from the original shore line. It is almost unthinkable that a mass of beds should have been turned up and eroded off so regularly that the croppings of the residual mass should coincide with the contours of the undisturbed strata. When the disturbance is accompanied by faults the difficulty of such an hypothesis is increased. Hence the auriferous character of the present croppings for thirty or more miles indicates that the gold-bearing pudding stones represent a broad band or sheet of metal-bearing rock, not a narrow strip along an ancient shore.

(To be Continued.)

* Eighteenth Annual Report Mineral Resources of the United States.

Geology of the Yukon.*

NUMBER III.

For opening up more rapid communication, some route from the coast in the vicinity of Juneau seems most feasible. The waters of the Yukon are navigable for river steamers of light draft up to the head of Lake Lindemann, except for two or three places where short rapids exist. Two or three steamers, built with due consideration as to the character of that part of the river on which they were to ply, would form a complete connection between the head of Lake Lindemann and the gold region during the four or five months that the river is unfrozen. The head of Lake Lindemann is only twenty-five miles from the navigable water of the sea. Another measure which would be of great value would be the building of a wagon-road from the coast, in the vicinity of Juneau, to the junction of the Lewes and the Pelly rivers, which point is below all obstructions to navigation. This road could be built across some of the mountain passes other than the Chilkoot.

In bar diggings, the material which has to be washed consists largely of coarse, round pebbles; and by whatever processes the gold is extracted, these pebbles are separated first. There then remains the finer material, which is made up of the heavier constituents of the same rocks. Black sands which consist of magnetite, hematite and sometimes galena are nearly always abandoned, and in some diggings there is a "gray sand," consisting mainly of heavy spar; and when, as in Forty-Mile creek, the stream flows through schists, garnets derived from these form a very important part of the residue. All these, however, are still lighter than gold, and are evidently separated from it by means of their inferior specific gravity, through the agency of water applied in various ways, or finally by air applied by a bellows.

The gold pan which is worked by hand is the simplest contrivance for separating the gold from the gravels. The next contrivance generally made was the cradle, which is constructed on essentially the same pattern as cradles which were used in California and Australia in the early days of placer mining. The cradle consists essentially of a long, narrow box, with an upper and a lower compartment. The floor of the upper compartment is preferably made of metal, and is riddled with holes of convenient size. Into this upper compartment the gravels are shoveled, and the whole contrivance is moved back and forth upon the rockers on which it stands, and from which it derives its name. By this shaking the gravel is sifted; the finer material passes through the holes into the lower compartment, while the coarser material, which contains little or no gold, passes out of the box as usual rubbish, or "tailings," as it is technically called. The floor of the lower compartment is in its simplest form an inclined plane, the surface of which is roughened or corrugated in various ways, such as by the use of cleats or wooden "riffles," corrugated metal sheeting or other devices. A favorite method of obtaining this result among the miners of Alaska is by the use of carpet of coarse, spongy weave, such as ordinary tapestry. Upon the roughened surface the gold lodges, while the lighter material is carried by out of the box by the stream of water. In the collection of fine gold which is thus caught, amalgamation with quicksilver is usually resorted to.

In some bars there is considerable concentration of gold, and when the river is sufficiently low these accumulations are worked by the miners; but the comparatively smaller size of the deposits, and the fact that they are exposed only an uncertain length of time during low water, lead to the necessity of using the simplest apparatus, and so the cradle is generally utilized.

In the gulches the conditions are entirely different, since the amount of water in the stream bed is usually small and can be diverted, if necessary, and the gold occurs in a small channel in the narrow gravels. These gulch gravels vary in thickness from about 3 or 4 feet to 20 or 30 feet. Their upper parts, however, are invariably barren. The gold is all found concentrated at the bottom, whatever the thickness of the upper gravels may be. The gravel which contains gold in workable quantities is technically called "pay dirt." It is usually not more than 3 or 4 feet, and from that thickness it runs down to a few inches or less. The bedrock itself, at the junction with the gravels, usually contains gold, and often repays working for two or three feet down, and sometimes the richest dust is found in this partly disintegrated schist. In the thin layer of pay dirt which rests upon the schist, the gold occurs in particles disseminated through, with gravel containing many large and little-worn fragments of schist and quartz.

When the overlaying barren gravels are not too thick, they are stripped off by shoveling, and the pay dirt is laid bare. Then a long, slightly inclined trough, called a sluice, which is built in sections of equal length, so as to be taken down easily and transported from one place to another, is constructed of boards. The boards for this purpose are cut by the owners from logs, with the aid of a whip-saw. The different sections of the trough or sluice are called boxes, and when these sluice-boxes are arranged consecutively, and in position convenient to the deposit of pay dirt, the water flowing in the bed of the gulch is partly diverted into them, so that a continuous stream flows through the sluice and empties at its lower end. The pay gravel is then shoveled into the boxes, mostly into the upper ones, so that the gravel will be carried as far as possible before being thrown out. The current is so regulated that the finer and lighter materials and the smaller gravels are immediately carried out of the trough and deposited at the lower end, while the large pebbles and the heavier small particles sink to the bottom and advance more slowly. The largest stones are removed by a miner who stands ready with a shovel to clear the boxes of such incumbrances. The heaviest of all the materials is the gold, which finds its way to the bottom of the sluice.

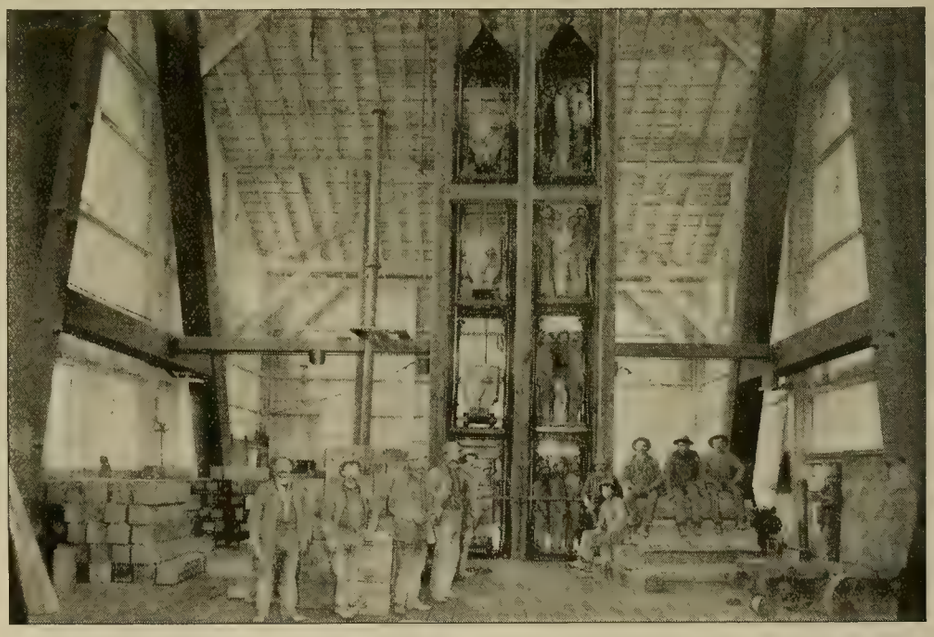
To prevent this from escaping, a series of slats are inserted in the bottom of one or more of the boxes at the end of the sluice, and these slats or "riffles," as they are called, afford a lodgement for the heavier particles. The riffles are usually placed parallel to the sides of the box and connected by cross cleats, although various other patterns are employed. At stated intervals the current of water is turned off from the sluice, the slats or riffles are taken up and the heavier material which has accumulated is carefully collected. This accumulation is very rich in gold, and also contains magnetite, hematite, limonite, galena and pyrite, as well as many fragments of rarer heavy materials. This material is generally washed by hand in a gold pan, thus securing a greater concentration of the gold; but there still remains some pyrite, galena, hematite and magnetite which cannot well be separated from the gold by washing. The magnetic iron, which is known as "black sand" by the miners, is extracted with a small hand magnet, and the other minerals are separated from the gold by blowing the aggregation with a small hand bellows. The pyrite, hematite and galena thus blown out are roasted, ground and panned, and then yield considerable free gold.

(*To be Continued.*)

* Condensed from advance sheets of "Geology of the Yukon Gold District, Alaska," by Josiah Edward Spurr, of the U. S. Geo. Survey.



PRECIPITATING COPPER IN SOLUTION IN WATER FROM ST. LAWRENCE MINE, BUTTE, MONTANA.



INTERIOR OF A SHAFT HOUSE IN BUTTE, MONTANA, SHOWING FOUR-DECKED CAGE.

Butte, Montana, Copper Mines.

On this page are depicted two Butte, Montana, mining scenes, one showing scrap iron scattered in pools of water from the St. Lawrence mine, on which copper is precipitated, another showing a four-decked cage, men on one side, cars on the other, ready to descend in the main shaft of the Anaconda. The engravings are furnished through the courtesy of the Butte *Miner*.

Mining Summary.

CALIFORNIA.

Amador.

The Lincoln mine at Sutter Creek, which has been idle for nearly twenty years, has been bonded for four years for $200,000 to a Scotch company.

The final payment on the Anita mine was made last week in the sum of $10,000.

At Jackson the Acme tunnel is in 240 feet and that on the Tiger has been pushed 100 feet. Both properties are showing well.

Dispatch: At West Point mining affairs are decidedly looking up. Old and new properties are being worked, and in most cases with satisfactory results. The Machu has been bonded to parties who propose to give it a thorough trial. The Scottish Co. has commenced work on several mines in the district in a small way, with the promise of largely increasing its working forces. Work is being done in the Ketz, Smuggler and Paragon mines, and results are said to be satisfactory. On the Beauchemin two shifts are at work.

Work at the Alma has not stopped permanently; so soon as title to the eastern portion of the property can be secured, work will be pushed.

At the Driesbach a tunnel has been run below the shaft, and a ledge of good ore has been struck.

On the Peter King mine the tunnel is 470 feet.

Record: The Oneida shaft, which is down about 1500 feet, has cost an average of $65 per foot. The cost of the Gwin shaft, which is of smaller dimensions, is understood to have been from $35 to $50 per foot.

The Argonaut mine is the largest producer in Amador Co.

The Baliol mill was started again last week. The company is preparing to sink.

Butte.

The new 40-stamp mill at the Banner began crushing last Wednesday.

The Big Betsy mine near Enterprise is to be operated again.

The Nimshew mine will soon be in operation again.

Mercury: The shaft on the Mt. Ida, near Hurleton, is 90 feet with a 100-foot crosscut at that depth. The ledge was 18 inches at the top, but averages 6 feet on the crosscut. A 5-stamp mill is running constantly.

Calaveras.

Ten stamps are kept dropping at the Gold Hill mine. The ore is said to be very satisfactory. Fifteen men are employed. C. Wolf is Supt.

At the Demarest ten men are employed and the work of straightening the shaft, retimbering and puttiug in a skip is in progress. The shaft which was sunk years ago to a depth of 125 feet, has two levels, one at 80 and the other at 100 feet. The mill has been running for the past two weeks and the ore and sulphurets—especially the latter, assay very high.

At the Lightner M. Co. twenty-six men are employed erecting the mill and sinking the shaft, which is down 450 feet and crosscutting is in progress at the 200, 300 and 400-foot levels. The new machinery is to be in running order March 15th.

Chronicle: Last week fifty-five boxes of crystals were shipped from the Green Mountain mine to New York and when values are better determined, the owner, if warranted, will return to Mokelumne Hill and prosecute a still more extensive exploration of the ancient river channel. The Green Mountain mine is to be opened at once for hydraulicing.

El Dorado.

(Special Correspondence). — Work is progressing favorably and rapidly at the Limpensel mine on the outskirts of town. This property was worked for pockets principally, but for many years it has been idle. Recently J. C. Diamond secured an option on it and is pushing its development. The shaft is 120 feet, and on the ledge for 75 feet. An old tunnel has been put in good repair which taps the shaft. In the tunnel the ledge is 25 feet. The footwall is greenstone and the hanging is greenstone. The ledge is on the east belt of the mother lode. One would scarcely believe that exceedingly rich ore has been encountered in the short distance the shaft has been sunk, but "seeing is believing." J. C. Diamond of San Francisco is part owner and manager.

Placerville, Feb. 7th, '98.

(Special Correspondence). — The Goldbug Mining Co., a Cleveland, Ohio, corporation, after two years of continuous work, has completed its plant, which is of considerable magnitude. The property comprises 150 acres of tailings of the Canyon Creek placer mine, operated forty years ago. A bedrock cut 8 feet wide and 600 feet long is a portion of the work, together with a complete hydraulic plant, installed by the present company. They will use 300 inches of water under a pressure of 350 feet, and will work under permit from the Debris Commission. The property is one and one-half miles from Georgetown. A. H. Ten Broeck is Supt.

Georgetown, Feb. 8th, '98.

Work has resumed on the Mt. Pleasant at Grizzly Flat.

The Bright Hope and Taylor mines resumed operations last week, the water supply having become sufficient for power purposes.

Nine men are at work in the Franklin mine on the tribute system.

Work is progressing in both shafts at the Griffith Con.

Nugget: A San Francisco development company has bonded a quartz ledge on the Egger range and started work. They have appointed J. J. Grossman Supt.

The Engesser is turning out well. They have a vertical shaft 75 feet and some rock highly mineralized.

Drifting is going on in the old Petaluma tunnel near Fair Play by a Sacramento company. The Mulkey mine is taking out rich gravel from a 60-foot channel, with 4 feet of gravel.

Dunn & Gillespie, above Fair Play, have an upraise of 10 feet to make to tap the channel.

Humboldt.

The new way of raising and sluicing sand now being carried on in beach mining by Olmstead, Parker and others, on the first claim above the mouth of Harris creek, is the first of the kind ever tried in that part of California. The plan is a simple one. Water is run from a dam on Harris creek through piping to the claim and into the sand pit, in the center of which is a 5-inch pump. The water reduces the sand to a consistency that makes the mixture easy for the pump to handle, and instead of being shoveled into the sluices the sand is pumped in, thus enabling the pump to handle, with the aid of three men, about what it would require fifteen men to shovel. The plan was conceived and put into operation by E. Ellis, and is under his management.

Inyo.

The Inyo County Mining and Development Co., formed one year since, which purchased the Lane silver mines near Keeler, has three claims. Three shafts have been sunk, the deepest one 700 feet. In all, the tunnels and shafts now aggregate 2700 feet, all of which have shown ore. A smelter is being erected at the mine.

Kern.

The new district, eight miles west of Kernville, is attracting considerable attention. The greatest depth attained in the district is 80 feet, through a tunnel on the Welsh Gillan mine, from which a number of tons of free-milling ore have been taken which assay over $20, the ledge being 6 feet wide. On the Margaret mine the vein at a depth of 100 feet changed from porphyry to quartz. Ore from these mines is milled at the low rate of $3 50 to $4 per ton, the cost of hauling to the mill being only 70 cents. About forty claims have been located.

The pleasant weather has facilitated dry washing in the Stringer section and several machines are at work on pay dirt.

At Randsburg the Yellow Aster M. Co., the Rand group, is sending ore to the mills at Garlock. The new road has made a rate on ore, graded according to richness, $1.25 to $3 per ton to Kramer. A new stamp mill is to be erected on part of the ground belonging to the Kinyon mine. Figures show it cheaper to haul the water to the mill than to haul the ore to the water.

Ryan Bros. of San Francisco are building a thirty-ton cyanide plant at Rosamond, where there is abundance of water. Conklin & Baker, owners of the Elephant mine, Mojave district, are building a large ore-house. There is on the dumps and in the mines considerable sulphurets which can be reduced when local mills, concentrators and cyanide works are established.

Mariposa.

(Special Correspondence).—The California Exploration Co. expects to start its new 10-stamp mill on the Virginia mine about Feb. 12th. The old 8-stamp mill has been torn out and a new plant installed, with ten 950-pound stamps, two vanners and a concentrator. The company has also put in an air compressor and drill plant and an electric lighting system, and a new hoisting engine will be in place at the main shaft shortly. Sinking is in progress below the 400 level. About ten men have been temporarily laid off as all available storage room was already filled with broken ore.

The Lafayette M. Co. has secured an option from P. P. Mast, of Springfield, Ohio, for the Bandarita mine and mill, on the North Fork of Merced. They will extend the lower tunnel some 500 feet and crosscut the vein. In the mean time the mill will be placed in good order for operation.

The Standard Con. Co., of Bodie, has resumed work on the Shilling property, on the North Fork, and will continue sinking on the vein. One payment has been recently made on the property.

Two men were severely crushed in the Virginia last week by a slight fall of ground, and on the 5th two miners were killed by an explosion in the Teadron mine, at Whitlocks, and on the same day one man was killed in the Gambetta, at Grub Gulch.

The tunnel on the Bondurant is still being run to catch the ledge in the old workings. The face of the tunnel is now about 300 feet beyond the point where it was expected to cut the ledge. In the bottom of the shaft on the old workings, 800 feet above the tunnel, the vein was very flat but it seems to have straightened up very much below that point. The work is being done by the Boston & Mariposa M. Co., which formerly operated the Red Cloud mine.

Hilliard & Hedges have declined the offer of J. W. Mackey for their Marble Springs property, recently reported in this column.

Mariposa, Feb. 7th, '98.

Mono.

At Lundy the Jackson and Lake View M. Co. closed down February 6th. Of thirty miners and millmen four remain as watchmen. Operations will be resumed next spring. The past few years this company has been working day and night, and now repairs must be made.

Supt. Nelson of the Copper Mountain mine shipped six tons of ore to Bodie to be worked by the Soderling process.

Napa.

Calistogian: The Sulphur Bank quicksilver mine has been bonded for a period of six months, and it is stated that the new company will commence operations at once.

Nevada.

(Special Correspondence).—The Brunswick Con. mine has completed its new pumps which are among the largest of this section. Three plungers of 10, 12, and 14 inches have been installed to the 900 level. The mine will be unwatered in about ten days, and then the mill will be started.

The company is drifting on the 900 level, having gone east 380 feet, and 520 feet west. When work is resumed, it is hoped that there will be good news to chronicle from this property, as evidenced from the encouraging strike made before closing to install the pumps. They who should know anticipate that the Brunswick will henceforth be among the dividend payers of the county.

The management, I learn from trustworthy sources, has been changed from New York to California. Freeborn J. Fletter, of San Francisco, is Gen. Mgr. and Wells, Fargo & Co. treasurer. C. H. Mallon of Nevada City continues as Supt.

Grass Valley, Feb. 7th, '98.

(Special Correspondence).—The old Kirkham and Cleveland properties, comprising four claims, which were combined into one group and are now known as the La Suerte mine, had been abandoned for years. The present company began work in May, '96. They have 2000 feet of tunnel and a shaft 350 feet, at which point they are cutting a station. They have a steam hoist and a 10-stamp mill run by water. The ledge is 3 feet and the ore a fair grade. J. M. Buffington is Supt. The property is owned by San Francisco people.

Nevada City, Feb. 7, '98.

T. T. Kirkbam has begun work on his gravel claim at Mt. Vernon, using a 2½-inch nozzle and about 100 inches of water.

The Gold Bar and O. K. mine, a mile east of the Idaho-Maryland, idle for a number of years, is being equipped with a mill and hoist. It has a 300-foot tunnel and a 2½-foot ledge. A shaft is down to water.

Telegraph: A crushing of thirty-six loads of ore from the Wisconsin mine at Grass Valley yielded $20 per ton. Work is going steadily on in the mine and the further the developments the more the encouragement.

Placer.

Illustrating the need of water in mining operations, the Colfax *Sentinel* says: The winter has been a disastrous one for hydraulic miners. Monitors are in place, dams have been constructed and permits to mine have been issued as follows: Two monitors near Colfax, two monitors at Gold Run, four monitors near Dutch Flat, one monitor at Lost Camp, one monitor at Shady Run, one monitor at Mayflower mine, one monitor at Yankee Jims, one monitor at Michigan Bluff. At the above claims, with the exception of one at Colfax and two at Dutch Flat, they have been patiently awaiting water since early in December. With plenty of water, each should have made at least two clean-ups. Nearly all of the drift mines have been short of water for washing gravel, and consequently reduced their force of men. Owing to continued cold weather and short supply of water, but ten of the twenty stamps at the Pioneer mine have been dropping for several weeks.

At the Cedar Creek mine, Shady Run, the drift is 300 feet in length, 7 feet high and 6 feet wide. The gravel is considered rich. A. Rodgers is Supt.

The vein in the Hobart mine, near Alta, measures 30 feet and the ore is rich. W. Nicholson is Supt.

The Mohawk drift, on Moody Ridge, is working steadily.

The Gold Blossom mine is now one of the largest in Ophir district. At the Three Star, a large mine, work is progressing rapidly. The Hathaway is working a large force, and the Bowlder, Eclipse, Pellows and Doyge are all working.

Sentinel: The outlook at the Lost Emigrant quartz mine on the North Fork of the American, sixteen miles from Soda springs, is said to be encouraging. The shaft is 74 feet on the ledge. A test of rock on the surface shows a value of $165.80. Ore from the bottom goes $173 to the ton. The mine is owned by Goulden & Co.

Plumas.

Tunnel No. 1 of the Arctic mine is in 275 feet, from which point a drift is being run on the gravel bed. The gravel shows colors and is indicative of success.

Bulletin: The ore of the Butte Bar Ledge mine near Plumas assays $40 51 gold and $5.70 silver; concentrates assay $154.21 gold per ton and $34 21 silver. The ledge is from 6 to 10 feet wide. With a short tunnel it can be tapped 1500 feet in depth.

San Bernardino.

The *New Era* says word has been received from New York that the application of Mr. Sigafus, the present owner of the Good Hope mine, for a new trial has been denied by the United States Court of Appeals, and that the judgment of $300,000 obtained against him by the Good Hope M. & M. Co. over a year ago will stand.

San Diego.

Capt. Farnsworth is having 100 tons ore from the North Star crushed at the Ready Relief mill.

The second report of Receiver Pauly of the Golden Cross mines at Hedges covers from Oct. 1st last to Jan. 1st. At the time of the previous report, October 1st, the receiver had on hand $50,239.65. A clean-up on Nov. 1st netted $46,430.26, a clean-up on Dec. 1st netted $47,066 61, and the clean-up of Jan. 1st, 1898, netted $43,086 31. During the time covered by the report Receiver Pauly incurred and paid out $141,407.96, and has in bank $48,808 92, from which is to be paid $19,161.59 for labor, fuel and merchandise in December. The receiver has paid to the defendants in the case of the Golden Cross M. & M. Co. vs. James Spiers et al., under which Mr. Pauly is acting as receiver, the sum of $60,000; and according to the report the mines will produce sufficient bullion to pay off all indebtedness of the property. The average number of men employed is 214. The 40-stamp mill that has been lying idle has been put in repair and as soon as the ore is supplied will start up.

H. W. Blaisdell has bought the old Dr. Jaynes mines, in the Picacho district, and will erect a stamp mill.

At Hedges the Free Gold Mining Co. has 200 employes at salaries ranging from $2 to $8 per day. The monthly clean-up seldom amounts to less than $50,000. The three big mines of the Golden Cross group are the Cross, the Crown and the Queen. The latter is being successfully worked beneath the fourth level. Above, the damage by fire was so great and the ore bodies so nearly exhausted that it has not been deemed prudent or advisable to attempt to clean the levels out.

Southwest from the Queen a quarter of a mile is the Crown, where the working shaft is 550 feet deep. Between the third and fourth levels most of the work is being done in this mine, and almost daily new bodies of ore are being opened up. North of the Crown a few hundred yards is the Cross, the original discovery.

Shasta.

C. E. Newton is mining on the river below the Calumet mill and meeting with success. The three furnaces at the smelters were all in full blast last week, which has not been the case for a long time. It means the employment of many men and a bigger pay-roll.

The Summit mine, at Sunny Hill, has a drift and drift tunnel in over 1100 feet. Several small ledges were crosscut in running the drift. A contract has been let for 300 feet of drift, to find the main ledge.

The old Lucas mine, on Middle creek, near Shasta, is being reopened, preparatory to extensive development. The tunnel is in 200 feet, in which the vein averages 18 inches. In the shaft, at a depth of 40 feet, it is between 3 and 4 feet.

Searchlight: The Milk Maid mine is running in full blast. There are thirty men employed.

The Hobo mine, above French Gulch, is again in operation.

The Vagle and Rheinhaus mine is taking out good ore.

The Washington mill started last week on good ore. It is worked under lease.

The Hunt mine at Tower House gives promise of being a good property.

The 4-stamp mill at French Gulch is running in good rock.

At the Chapman & Valentine mine, near Centerville, work is being prosecuted on a 30-foot bank—ground that was formerly drifted on the bedrock. Good results are being secured on the same ground by piping.

Johns & Co., who recently completed a run of ore at the Uncle Sam mine, under a lease, have secured another lease for six months and began taking out ore. The property is owned by the Sierra Buttes Co.

Sierra.

(Special Correspondence).—The main tunnel on the Stanley Drift mine has reached 2400 feet through serpentine. It strikes the channel at 1500 feet. There are 2500 feet additional of tunnel work, all in pay gravel.

The gravel runs from 15 inches to 50 feet in depth; the average pay streak is 3 feet. The ground pays an average of $1.50 per car by the sluicing process, though the gravel is cemented. There are 225 acres in the mine, and 5000 feet of a channel yet unopened.

Alleghany, Feb. 5th, '98.

P. Doray has leased his Slate creek claims near Sierra City for $5000.

John Lassiat of Poker Flat is in charge of the copper ledge on the north fork of Canyon creek.

The Miners' Home Co. proposes to work over the drifted ground at Howland Flat.

A San Francisco company has taken hold of the Rising Sun mine, Sierra City. As soon as the pipe and machinery arrive they will begin operations.

Wm. York and sons, who some time ago struck it rich in the Rising Sun, Downieville, again encountered rich rock last week. A bar worth $650, representing a portion of the clean-up from the arrastra, was shipped last week.

Siskiyou.

The Northern, working the bed of Dutch creek, is sinking to bedrock and expects to put in an elevator, as the diggings are deep and there is no chance for drainage. This Dutch creek is a different one from that near Honolulu.

The Chinamen at work on Greenhorn have been obliged to shut down, on account of the court deciding against their right to use the bedrock drain of the creek claimed by Scheld.

The warm weather of the past few days, and the welcome light rains, have enabled several companies to start work.

The Aromas Co., near Sawyer's Bar, is pushing work on the new ditch, to be ready for work in the early spring.

In the Morrison & Coburn mine, Quartz valley, the shaft has been extended 120 feet; a drift on the vein is being extended 100 feet.

The Mountain Bell and Mountain King quartz mines, on Humbug, sold a half-interest for $2500.

Chester and Lighthill took $191 in specimen gold from a little chimney in the Myers mine, in Quartz valley.

I. Baer has purchased an interest in the Barnes mine on Cherry creek.

Hunter & Smith are taking out some rich rock from the Barnes mine at McAdams. Four tunnels are being run on a vein of ore varying from 8 to 16 inches.

F. Mallow is working the Craig mine on Cherry creek and has finally tapped the back channel. He has ground that is paying him from $3 to $5 per day to the man.

H. Schroeder of Deadwood has a ledge of rich ore and will build a new mill in the spring.

Baker Bros. are getting pay ore from the Smith mine on Indian creek.

Journal: Machinery is being arranged for hoisting from the new shaft at the Cavern gravel mine, Yreka. The property is bonded to a Colorado company.

Hansen & Dannenbrink Bros. of

operating the Gold Run quartz mine at Know Nothing creek.

The Baker Bros., at Indian creek, are taking out good ore.

The Solomon quartz ledge on Solomon river is being worked by Bowerman & Fletcher and yields $10 per ton.

Scheid & Butler, Yreka flats, are sinking to reach bedrock. The gravel gives good prospects.

Hunter & Smith started work in the old Barnes ledge at Cherry creek.

Trinity.

The Highland mine is thoroughly fitted up and will be worked full blast as soon as water comes.

Along the river from Taylor's Flat to Willow creek a number of placer properties are being worked. New discoveries have been made in that section of high benches of gravel.

Tulare.

There was a lay-off of miners at the Tale mine, White river, until the rock taken out is ground. If they have a good clean-up, the mine will run full blast. Otherwise it will be closed.

Tuolumne.

The Mother Lode Co. has begun the construction of a 10-stamp mill on the Sell mine, near Sonora. There are 22,000 tons of ore that will yield over $8 per ton. The vein in the Sell has been opened a distance of 700 feet in length and a depth of 700 feet from the surface, the body of pay ore being 400 feet long.

Work at the Dutch M. & M. Co.'s new mine, the Dreicham, is being rapidly carried on in daily expectation of opening a rich vein.

The new milling plant of the Gagnere M. Co. at Tuttletown is in operation. The battery blocks measure 30x32, the battery posts 20x26. The foundation is rock and cement. The retaining walls are constructed of stone. Both mill and hoisting works are lighted by electricity.

Democrat: At the Estrella the crosscut tunnel is being driven rapidly. It measures 247 feet.

The new double compartment shaft on the Gerrymander is down 45 feet.

The Grizzly is running a third level from the new shaft to tap the old workings.

Progress is being made in the crosscut tunnel on the Hope mine.

Yuba.

(Special Correspondence).—John Martin & Co. are operating the Abbio, one mile from Brownsville, and are running ten stamps. They are erecting a cyanide plant, which will be ready to start in about a week, for cyaniding the sulphurets and tailings.

At the Good Title they have reached beyond 200 feet depth. The ore in the bottom of the shaft averages 6 feet and is of low grade. About one year ago this property was opened by J. E. Poingdestre of Nevada City. T. J. Carson of Cincinnati took charge January 1st.

J. E. Poingdestre, still a director in the Good Title mine, has purchased the John Johnson mine and ranch, comprising 140 acres, U. S. patent, in Yuba county, two and a half miles from Forbestown, on which he will begin work early in spring. There is a shaft on the mine 45 feet. The ledge is 5 feet on the surface and 8 feet at the bottom of the shaft. A number of assays have been made and they run from $3.50 to $8 per ton in free gold, and 8 per cent in sulphurets that go from $125 to $350. The property will be thoroughly and systematically developed with a view to paying especial attention to it as a low-grade proposition, and treating the sulphurets by the cyanide process. With the capital that developed the Good Title, and its successful management, this section has attracted attention. The Abbio is also proving a success thus far. The Denver, near Forbestown, is giving satisfactory returns through its 10-stamp mill. The Gold Bank, in its low-grade ores, has proven a success.

Forbestown, Feb. 7th, '98.

(Special Correspondence).—At the Pennsylvania mine work is progressing. The company is running a drift on the 800 level. The ledge is 4 feet and the ore a fair-grade quality.

Browns Valley, Feb. 7th, '98.

Appeal: Engineer Hubert Vischer and ten assistants have commenced work at the Narrows, one mile northeast of Smartsville, to ascertain at what depth bedrock may be found.

NEVADA.

Dr. W. J. Nelson of Boston has bought from Johnson, Lund & Campbell for $200,000 a group of twenty-four claims in the Eagle Valley mining district, seven miles southwest of Stateline district, Lincoln county. Dr. Nelson is at the head of the Boston Copper Co., which is operating a smelter in Lyon county.

Mr. Holmes of South Africa is at Como, in the interest of English capital, investigating the Logan and Hully mines. If the properties meet with his approval, his company will purchase and develop them on a large scale.

OREGON.

The Seven Devils mines is making daily shipments of high-grade ore.

C. Martin is hydraulicking with good success near Medford.

Read & Broad are operating the Oregon Bell quartz claim on Forest creek, Medford.

At the Braden mines, near Ashland, about $1000 was cleaned up in a ten days' run.

The Lucky Queen mine, near Ashland, has been leased to Spokane parties.

F. McCracken is working a promising placer mine near Leland.

Three tons of ore from the Golden Standard, Ashland, yielded $436, an average of $145 a ton. There is a large quantity of quartz in sight.

Over $1000 in gold has been taken out of the new mine found about a mile from Canyon City.

J. Johnston has purchased the Big Blue, Blue Bird and Great Eastern mines, near Baker City, and has begun operations. The ore run $22 per ton in gold.

The Crystal Palace, near Union, is being thoroughly developed by E. E. Clough.

Work is being done on the Ollie Woodman, near Union, with good prospects.

E. E. Clough is developing the Ainsworth, at Union, with reasonable anticipation of having a good property.

Returns from ten tons of ore from Barron & Shepherd's mine in Sampson creek district, Ashland precinct, have caused quite a number of claims to be located there.

Ashland *Tidings*: The purchasers of the Bonanza group of mines, which includes the Eclipse, Hidden Treasure and Oregon Bonanza, paid a cash consideration of $4000 for the properties.

Baker City *Republican*: There will be twenty additional stamps dropping on the ores of Grant and Baker counties in a short time.

F. Pfau, Mgr. Bonanza-Elkhorn M. Co. at Elkhorn mountain, says that his company is doing extensive development work. A tunnel to be 2000 feet in length is now in 500 feet. Already three ledges have been cut.

WASHINGTON.

Work has begun on the group owned by the Uncle Sam M. Co., on Dead Medicine creek, in Stevens county. M. McCarty of Bossburg is Supt.

BRITISH COLUMBIA.

The ledge has been struck on the Riverside claim, three miles north of Grand Forks. The tunnel at a distance of 180 feet is in ore carrying good gold values. The tunnel will be pushed ahead until the ledge is crosscut.

The group of claims, near Claycquot, were sold for $30,000 to a Colorado Co.

Reisterer & Clements of Nelson purchased the Bismuth, Squire and Leading claims, on Hidden creek for $5000.

The mineral exports of southern Kootenay for January are the greatest in the history of the district, aggregating $1,193,458. Compared with January, 1897, they show a gain of 100 per cent.

Work at the Fern mine is progressing and large bodies of ore are being uncovered. The company has commenced the installing of a cyanide plant. Thirty tons per day are milled. An additional ten stamps will be added as soon as the cyanide plant is installed.

A shipment of ore made last week from the Republic mine, near Slocan City, to the Nelson smelter went 205 ounces in silver and $18 in gold to the ton. The shipments from the smelters last week were: Nelson (Hall mines), matte, 40 tons; Trail smelter, matte, 240 tons; total value, $265,140. The total value of the ore and matte exported was $518,635.

IDAHO.

Dredging is soon to be tried in the gold belt of the Cœur d'Alenes. The parties interested in the undertaking are Eastern men. They have secured thirteen claims.

The stamps in the De Lamar mill are hung up and the pan mill department shut down. One hundred and ten miners were drafted. The leaching tanks will soon be completed and work will begin on the east half of the mill to equip it in a like manner. As soon as the tanks under construction are completed, enough miners will be put on, and the number increased as other tanks are completed.

The Chloride Queen M. and M. Co., near Wallace, has struck a stringer 18 inches thick that carries considerable gray copper and gold.

Work at the Cumberland, near Silver City, is progressing very satisfactorily. The mine is opening up much better than was anticipated.

Ten men are employed at the South Central, near Silver City, on development work. They are taking out some high-grade shipping ore from the lower levels.

P. J. Clark, on the Elkhorn at Ketchum, at 400 feet depth cut the vein on the footwall and tapped the ore shoot underneath the old works. In early days the Elkhorn is said to have produced over $1,000,000, principally from the surface.

The Rich Hill M. & M. Co., near Cœur d'Alene, is growing better as the tunnel is driven, and giving satisfactory returns.

UTAH.

The Geyser-Marion properties have been bonded for a period of four months to G. F. Downey on a basis of $450,000, or $1.50 per share, for the stock. At the annual meeting the Dern management was retained. The reports showed receipts to December 31, 1897, of $148,235.92, and disbursements, including $63,000 in dividends and payments for extensive development work, of $149,711.46, with product in transit not settled for. The gross cost per ton of ore mined and treated was $1.96.

The Lulu tunnel, in the Mercur mine, developed bodies of $12 and $15 ore through much of its course, but now at a depth of a little over 400 feet the ore across the face goes $23.60. This property paid $886,000 in dividends during the year and held a surplus in the treasury amounting to $178,972.10 January 1, 1898

Thirty carloads of ore left Lead mill and Bingham last week.

The shaft of the Star Con. Co. at Eureka is down 340 feet. A mill is one of the probabilities of the near future.

The Beck shaft at Eureka resumed sinking.

The recent shipment of gold ore from the Centennial-Eureka awakens renewed confidence in that mine.

The Crown Point M. Co. has brought suit in the United States Circuit Court against the Ontario Silver M. Co. to recover $1,955,285, the value of 35,506 tons of ore, which, it is alleged, the Ontario company has extracted from Crown Point ground.

The Mercur company, at its annual meeting, showed that the receipts for the year 1897, including cash on hand at the close of 1897 and the purchase price paid by J. R. De Lamar for the Resolute Fraction, was $706,704.30; disbursements for the same period, including $311,000 in dividends, $587,732.20. In the report it was shown that during the year 75,175 tons of dry ore had been mined and milled at a recovery of $6.47 a ton, and at a cost as follows:

	Per ton.
Cost of mining	$1.38½
Cost of milling	86
Cost of transportation	35
Total cost of mining and milling	$2.57½

MONTANA.

Sinking on the Spotted Horse mine, near Lewiston, is again in progress and ten of the twenty stamps in the mill are working.

The Peck Concentrator Co. has begun the erection of a plant, near East Helena. The U. S. smelter own and control the plant. Power will be furnished by the Missouri Dam Co.

At the 300-foot level in the Ruby mine at Townsend a rich ore body was cut which will average $70 in silver and gold to the ton, but the rich ore shoot which they expected to reach in 10 or 12 feet has not yet been cut. As it is, however, the mine is said to be wonderfully rich, and promises to become one of the great dividend payers of the State. In fact, the condition of the treasury at present is such that a nice dividend could be paid.

Inter-Mountain says the pumps at the Atlantic shaft of the Boston & Montana at Meaderville were hoisted last week, which is taken as an indication that the property will be abandoned for some time. Work was started about two years ago, during the time Capt. Couch was Gen. Mgr. of the Boston & Montana properties. It was supposed that the big copper ledges crossed the flat at some depth, and a shaft was developed to a depth of 800 feet. Bedrock was not reached until at a depth of 400 feet, where a petrified tree was found. Several crosscuts were run at the upper levels, but only stringers were cut.

SOUTH DAKOTA.

The shaft on the Two Bit mine, near Deadwood, is 140 feet deep and going down at the rate of 1½ feet a day.

The Golden Hill M. Co. at Two Bit has a shaft 60 feet in mineralized porphyry intermixed with blue shale which is highly mineralized.

COLORADO.

Nace & Davis have driven a 38-foot tunnel on the Helena W. at Eldora, and have a 20-inch vein of fine looking tellurium ore.

The Lakeview shaft, near Eldora, has reached 80 feet.

Work on the Irousides, Eldora, is being pushed. The tunnel is 40 feet, showing 18 inches of sulphide ore.

At a depth of 70 feet a vein 8 inches wide in the Harden shaft at Salida was uncovered last week. Assay returns were $9.60.

The Fowler smelter is running night and day on ore from the vicinity of Ouray, the Grizzly Bear, Wedge, Bachelor and American-Nettie being the principal sources. Iron ore from Leadville for fluxing is coming in at the rate of two cars per day.

At the Slide mine near Ouray ore has been encountered in the lower workings in such quantities as to foretell of this property again becoming a shipper.

Twenty tons of Congress ore is daily hauled to the Silverton smelter.

During January 173 ten-ton cars of ore were shipped from Ouray, an increase of forty-nine cars over January last year.

From fifteen tons shipped from the Central City mine, near Idaho Springs, the returns were $8.73 per ton. Daily shipments of fifteen tons are being made. The ore is taken from the 400 level, where it averages 6 feet.

The Tom Boy group, near Central City, was sold last week to F. Howbert of Denver. The shaft on the Tom Boy is 60 feet, and the new operators have commenced work straightening the shaft and putting it in shape for sinking.

The Fitz M. Co. began extensive developments on their properties at Leadville.

The Pyrenees shaft at Leadville has passed the 900-foot mark.

The Big Six and Nettie Morgan at Leadville are still shipping and there seems to be no sign of abatement in the discovery made some weeks ago.

S. Loder contemplates putting up a smelter at Ward with a capacity of 150 tons a day, adapted to treat the pyritic ore of that vicinity.

Hanum & Co. have secured a lease on the Abe Lincoln. It is their intention to put in a large pumping plant and compressor and work the property on an extensive scale.

A new ore chute has been opened in the Claypool block of the Bonanza King at Cripple Creek.

The Cripple Creek Con. Co. authorizes the statement that a rich and to all appearances permanent strike has been made in the Geneva claim.

The entire production of the Independence mine at present is smelting ore.

The ore shipments over the Golden Circle railroad from Goldfield for January was 8000 tons. The shipments from Independence depot will aggregate 1200 tons.

The bottom of the 24-foot shaft in the Grotto on Bull hill is filled with ore that will average better than $20.

Jackson & Co. are getting out 20 tons a week from the Lona Coning, Cripple Creek, the ore running close to $80 a ton.

The Garsten chute, opened a month ago in the Moon-Anchor, has been penetrated by the 400 level a distance of 40 feet, and carries good ore all the way. The Cobb chute has opened out again and measures 76 feet on the vein.

Malloy & Johnson made a good find in the Raven at Cripple Creek. They started work a few days ago in an old shaft, and in a drift from the bottom at 135 feet opened 2 feet of ore that gives average assays of from $60 to $100 a ton.

The shaft on the Campbell, Beacon hill, has reached 100 feet, whence a level will be run on the lead.

The Little May at Cripple Creek is running a shaft to the depth of 200 feet.

Tribune: Assays of the quartzite encountered in running the Cowenhoven tunnel, at Aspen, average eighty ounces silver and a good percentage of lead. The highest silver assay is said to be 140 ounces.

The Fairmount tunnel, near Idaho Springs, is in 320 feet and has cut two blind leads.

Daily Mining Record: The long and stubbornly contested fight over the title to the valuable tract of ground on the south slope of Bull hill, known as the Hall City placer, has at last been definitely settled by the Secretary of the Interior in favor of the placer. The only two points upon which the lode claimants relied at the last were a failure to do $500 worth of work and the fact that the name of W. A. Smith, a deputy United States surveyor, was included in the patent. The Secretary of the Interior ruled that more than the required amount of work had been done, and that the other point was not vital in preventing the issuance of patent, though Smith's name was ordered dropped from the patent.

The decision of Judge Lunt concerning the rights of the tunnel locators will serve to depress temporarily the boom created by former decisions. The idea that a man or company can start a tunnel into a mountain and confiscate everything within 1500 feet of its line, merely because surface locators have not proved their veins to the tunnel level, is absurd. The whole question, under Judge Lunt's decision, will again come up for review in the Supreme Court of Colorado and possibly reach the United States Supreme Court before stopping. The gist of the decision is that priority of location cannot be invalidated by a junior location, nor can a patented claim be invaded by a tunnel.

NEW MEXICO.

New Mexican: Apparently trustworthy information states that Thomas A. Edison, J. C. Burn, Richard Kerens and Senator Elkins have secured a two-years' option on the 65,000-acre tract of mineral land in south Santa Fe county known as the Ortiz Mine grant. It is understood that the purchase price agreed upon is about $1,500,000.

The Gypsy mine at Kingston will erect a mill. A test of the ore proves that it can be profitably handled.

The Simpson smelter, Copper Flat, is turning out copper bullion. The Hanover is working thirty-five men and turning out sufficient ore to keep the smelter constantly employed.

On the Oxide, Santa Rita, sinking has been resumed below the 100-foot level.

Crawford Bros., Silver City, resumed work concentrating the tailings at the old Pacific mill. They produce nearly half a million pounds of concentrates per month.

Copper ore has been developed at the foot of Burro mountain, twelve miles from Silver City.

The main adit level on the Cooney mine is 800 feet in length. The ore is peacock copper pyrites, running high in gold. The concentrates have brought returns of 50 ounces gold per ton.

Dimmick Bros. have reached a depth of 200 feet upon their Silver Cell mine, south of Pinos Altos.

Ore from the Eagle mine in Gold Hill assayed 8.64 ounces gold and 24.6 ounces silver per ton.

ARIZONA.

The Sun Dance G. M. Co., near Prescott crushes about fifty tons daily and ships from 150 to 200 tons concentrates monthly.

The last monthly clean-up of Fortuna's 20-stamp mill, near Yuma, amounted to $50,000.

On the Senator mine, eighteen miles from Yuma, the 20-stamp mill is crushing fifty tons of ore per day, which is brought from the bottom, 200 feet down, where a level has been run about 50 feet.

The Eclipse group of silver mines, in the Bradshaw mountains, is to be prospected. A new boiler and hoisting plant have been placed and the 200-foot shaft on the Lorena is to be sunk an additional 200 feet.

Mines in the vicinity of Payson, Gila county, are showing encouragingly. The Pay Streak is a late discovery, said to have a 3-foot vein of high-grade gold ore.

At Evans' Point, six miles above Clinton, a mill is in operation, and ten additional stamps are to be added immediately.

At Cedar Valley, forty miles south of Kingman, the Cedar Valley M. Co. is operating a 15-stamp mill.

A good strike is reported from the Hidden Treasure mine, near Prescott, at a depth of 40 feet and in 120 feet, of a lead that will assay over $100 to the ton.

A 30-inch vein of six-ounce gold rock is said to have been uncovered in the Gladiator mine, th rty-six miles south of Prescott.

Gillette's mill, on the Agua Fria, started last week and is run by electricity.

The Copper Glance mine, near Wickenburg, has developed from 4 inches on the surface to 3 feet at a depth of 12 feet, yielding copper, gold and silver.

Henderson & Fulton are working the Lennon mine, on Lynx creek, Yavapai county, and have encountered a large body of sulphuret ore.

The Gold Cliff M. Co., at Pearce, Cochise county, will erect a 10-stamp mill.

The Table Mountain Copper Co., fifty miles north of Wilcox, starts its two 60-ton smelters this week. It is claimed that over 5000 tons of good ore are now on the dump.

MEXICO.

The San Felipe has suspended assessments.

The Santa Gertrude of Pachuca has declared its 308th dividend.

The Salomon M. Co. of Zacatacas has ordered its seventh assessment of $5 per share.

The Guadalupe de la Montana has made its fifteenth assessment of $1 per share.

The recent placer discoveries on the Santa Cruz, seven miles from Nogales, are attracting considerable attention.

Four Thousand Words a Minute.

Prof. Crehore of Dartmouth College last week read before the Franklin Institute a report to the Postmaster General of experiments made in England last summer by himself and Lieut. G. O. Squier, U. S. A., with the synchronograph, a recent invention for the rapid transmission of intelligence by the alternating current. According to the report, the experiments were successful, and, it is thought, will effect a revolution in telegraphy and telephony. The idea of the synchronograph originated in 1895, when Prof. Crehore used the alternating current in an unperfected state at Dartmouth College and sent and received words at the rate of 800 a minute. Since then machines have been perfected that will send and record 4000 words a minute. The result of the experiment made shows that the use of the alternating electromotive force, which rises gradually from zero to a maximum and then falls again to zero as gradually, is the best kind of wave for use on actual lines with disturbed capacities. The substitution of the synchronograph for the Wheatstone transmitter on identical lines, using the same receiver in each instance, showed a speed of operation by the synchronograph about threefold faster, provided the mechanical limit of the receiver was not already reached.

The causes of this great increase of speed are differences in the waves which pass through the receiver; since the only way by which the identical receiver can distinguish between transmitters is by differences in the actual waves received. The waves of current passing through the receiver, which control its operation, are not of the same shape as the electro-motive force waves of the transmitter. The current waves received from the synchronograph are not true sine waves in the receiver, even though the electromotive force is truly harmonic, but the frequency is the same as that of the generator, and the waves are of equal length. The current waves from an alternator may approximate a sine wave very closely if the electro-motive force is harmonic, and, in fact, if there is no leakage on the line it will be truly harmonic; or under some circumstances it may still be harmonic, provided there is a correct relation between the leakage, resistance, inductance and capacity.

The Divining Rod.

M. E. Wadsworth, of the Michigan College of Mines, gives the following theory of the mechanical action of the divining rod, which he says has been repeatedly tested by him in the presence of his classes and shown to be correct. The process is exceedingly simple. Take any forked twig of reasonably tough fiber in the clenched hands with the palms upward. The ends of the limbs forming the twig-fork should enter the closed fist on the exterior side of each fist, *i. e.*, on the two sides of the clenched hands furthest from each other.

When a twig is grasped in this position it will remain stationary if held loosely or with only a moderately firm grasp, but the moment the grasp is tightened the pressure on the branches will force the end of the twig to bend downwards. The harder the grip the more it must curve.

The curvature of the twig is mechanically by the pressure of the hand, forcing the limbs to assume a bent and twisted position; or the force that causes the forked limb to turn downwards is furnished by the muscles of the hands, and not by any other cause.

The whole secret of the divining rod seems to reside in its position in the hands of the operator, and in his voluntarily or involuntarily increasing the closeness of his grasp on the two ends of the branches forming the fork.

If the above conditions are fulfilled, the twig will always bend downwards—water or no water, mineral or no mineral. Any one can be an operator, and any material can be used for an instrument, provided the limbs forming the fork are sufficiently tough and flexible.

It can be easily understood how an ignorant operator may deceive himself and be perfectly honest in supposing that some occult force, and not his hands, causes the fork to curve downwards.

Californian Pine Products.

Mr. W. C. Blasdale recently read a paper before the Science Association of the University of California (Chemical Section), relating to the products obtained by distilling the resins of some Californian pines. Some years ago a liquid was put on the market known as "abietin" or "aurantine," for use in removing grease, etc., and also as an anæsthetic. It was said to be made from the nut-pine. This was examined by Dr. Wenzell of the College of Pharmacy, who published the results of his work. It was afterwards thoroughly investigated by Prof. Thorpe, now head of the British Government laboratories. Prof. Thorpe found the liquid to be nearly pure heptane (C_7H_{16}), which is one of the paraffins, a substance which had only been found in petroleum and fish oil. The occurrence of a paraffin in a vegetable product was so extraordinary that it seemed doubtful whether the material was really obtained from the pine.

Mr. Blasdale therefore collected a quantity of resin from *Pinus Sabiniana* (the well known nut-pine or Digger pine of the foothills) and from several of our native pines, and distilled them in a current of steam. The amounts of material obtained were not large enough to allow of as full investigation as desired, but quite sufficed to show that the true heptane is undoubtedly obtainable from the resin of the nut-pine and also from the black pine (*P. Jeffreyi*) of the timber belt. These two Californian pines differ botanically in many ways from the Old World and Eastern species, which yield the so-called terpenes ($C_{10}H_{16}$) when their resins are distilled. On the other hand, the resin of the Tamarack (*P. Murrayana*) yields a terpene resembling that of the European and Eastern pines. The annexed figures show the average results obtained with the distillates:

	Boiling point Centigrade.	*Specific Gravity.*	*Index of Refraction*
P. Sabiniana (nut pine)	97°	0.6860	1.390
P. Jeffreyi (black pine)	97°	0.6863	1.388
P. Murrayana (Tamarack)	160°	0.864	1.476
Heptane of Professor Thorpe	98.43°	0.6885	1.388
Terpenes (about)	155° to 175°	0.85	1.45 to 1.5

The distillate from the Tamarack resin alone has a considerable effect upon polarized light, confirming its terpene character, while those of the first two (like true heptane) have scarcely any effect.

A number of products of California pines and firs were exhibited, including the balsam of the silver fir, which closely resembles Canada balsam, so largely used in microscopic work, and might be used for the same purpose.

PLUMBAGO as a lubricant for machinery has been tested by Prof. Thurston, at the Stevens Institute of Technology, with the following results: With a pressure of 48 pounds per square inch on the bearing tested, 335 milligrammes of the best sperm oil allowed 7198 revolutions to be made before friction caused squealing. With 120 milligrammes of perfected graphite, mixed with water, 19,635 revolutions were made before squealing began. With a pressure of 60 pounds, 335 milligrammes of best sperm oil allowed 33,360 revolutions; best lubricating grease, to same weight, allowed the same number of revolutions; the same quantity of grease, with 15 per cent graphite added, allowed 194,941 revolutions. The speed in all cases was 2000 revolutions per minute. To get such results, it is to be understood that pure flake graphite is to be employed.

CHEMICALLY pure iron exists only as a curiosity and has no practical application in the arts. It is void of commercial value and cannot be prepared upon a large scale.

Too Truthful to be Pleasant.

California as a gold country was the wonder of the world in the 50s. It ought to be a greater wonder now. But California became bewildered, missed its guiding star, took a different road and let another, with clearer vision, push by her. California lost her head over her oranges and olives, her prunes and her wheat fields. She allowed her farmers to become inflated with a misconception of their relative importance. She ignored the great law of supply and demand and quarreled with and oppressed her only class of laborers whose product is superior to this law. She allowed her millions and tens of millions invested in the mining industry to be confiscated. She branded her miners as criminals and confidence men. Her anti-debris commission sent out its spies to hale the luckless miner to prison. Her bankers meeting him upon the street passed him by on the other side. The subject became almost as a skeleton in the closet—a thing not to be mentioned by the daily press. A stranger passing through San Francisco would perhaps never hear mining mentioned or read of it in the daily papers. Its railroads carefully avoided all reference to it in their literature. Chinatown was something to herald—mining a subject to carefully avoid. Its camps were almost without exception reached by wagon roads only. Its railroad methods and purposes are too generally understood to need extended reference here. The most attractive gold mining territory under God's footstool, reaching from the Siskiyous to the Colorado desert, from the golden sands at the ocean's edge to the bleak plains of Nevada, has yet to do battle against all these odds for the preservation and maintenance of the most profitable industry any State ever had.

We cannot read the future, but we know that California is the Golden State by birthright, and that her possibilities no man can measure.—Oregon Mining Journal.

THE much-sought-for alkahest, or universal solvent of the alchemists, is almost realized in fluorine, which was first prepared by Moissan in 1886. The transparent vessels in which it is contained have to be made of some fluoride, its action on ordinary glass being very vigorous and destructive. The difficulty of handling the gas, even in the laboratory, has hence been very great, the fluoride vessels being brittle and clumsy as well as expensive. Professors Dewar and Moissan, being desirous of more fully investigating the properties of the gas, recently conducted a series of experiments at the Royal Institution, in which by means of liquid oxygen they succeeded in liquefying fluorine, and in this comparatively inert state could more fully and carefully examine its properties. The apparatus used for liquefying the gas consisted of a small cylinder of thin glass, into the upper part of which was fused a platinum tube surrounding a smaller tube of the same material. The fluorine enters through the larger tube, passes around the glass envelope, and escapes through the smaller tube. The glass cylinder being cooled down to the temperature of boiling liquid oxygen (—183°), the current of fluorine gas was passed through the bulb without becoming liquid. At this low temperature, however, the fluorine did not attack the glass. On still further lowering the temperature of the liquid oxygen, by exhaustion, a yellow liquid was seen collecting in the glass envelope, while gas no longer escaped from the apparatus. At this moment the escape tube was closed to prevent the entrance of air, and the glass bulb soon became full of a clear yellow liquid possessed of great mobility. Fuorine thus liquefies at about —185°. The chemical activity of the gas was found greatly reduced when in the liquid state, but even then benzine or oil of turpentine underwent spontaneous decomposition when brought into contact with it. It would thus seem that the powerful affinity of fluorine for hydrogen is the last to disappear. In a subsequent experiment, in which liquid air was used and a temperature approximating —210° obtained, the liquid fluorine showed no signs of solidification. Experiments to determine its density led to the conclusion that it had about the same specific gravity as amber, 1.14. Different samples of the liquid examined with the spectroscope showed no specific absorption bands in the visible spectrum. It was found to be not magnetic.

MUCH has been said of late years, in discussions concerning the "rare earths" and the search in them for new metals, about monazite; and the mineral has obtained considerable commercial importance in consequence of its use in the manufacture of the incandescent metals of the Welsbach light. Monazite is essentially a phosphate of the rare earth metals cerium, lanthanum and didymium. It also usually contains small variable percentages of thoria in the form of thorite or organite—a derivative of another rare metal, thorium. It crystallizes in the monoclinic system, in tubular or short columnar or needle-shaped crystals, usually well developed and free from distortion, varying from microscopic size to 5 inches in length. It is brittle, transparent in the purest crystals, and of shades of yellow or brown in color. It is an accessory constituent of the granite rocks and their derived gneisses, and has been found in apatite, cyanite and veined quartz, but not in sedimentary rocks. The economically valuable deposits are found in the placer sands of streams and rivers, in the irregular sedimentary sand deposits of old stream beds and bottoms, now covered up, and in the beach sand deposits of certain seashores. Workable deposits of monazite have so far been found only in limited geographical areas. The only one in the United States are the placer beds in North and South Carolina, though in recent communications to this paper Waldemar Lindgren of Stanford University cites the existence of monazite deposits in Idaho. The North and South Carolina deposits occur in gravel, from 1 to 2 feet thick, in streams that are seldom more than 12 feet wide. Other deposits are found in Brazil, the United States of Colombia and Russia. The value of monazite depends on its percentage of thoria, the earth sought after by the Welsbach light men. The Carolina beds furnished 1,900,000 pounds of monazite in 1896, at from 6 to 10 cents a pound. The next year the output fell off, both in the amount and price, on account of the competition of the Brazilian field, where the production is easier and cheaper.

AN electrical engineer, expert upon gas engine matters, says: "There is a big future in the foreign trade of gas engines; the innumerable uses to which they are applied are alone a recommendation and bound to create a demand. In a country where fuel is high they are mostly in demand. There are to-day American gas engines being extensively used in Europe. In Paris there are engines of 300 H. P. that were made in this country some time ago. Only a few days since the manufacturers of those engines heard of the great saving they were to the parties using them, and how highly they speak of them. Any town where ordinary gas is manufactured can be made a field for the sale of gas engines. The principal uses to which they are applied are for pumping and for driving dynamos for small plants; but when it is realized that to-day gas engines are made from ½ to 300 H. P., the many uses to which they may be put are extraordinary. The Central and South American countries are beginning to buy these machines, and it is expected that as their many uses are shown to the people the demand will increase."

THE value of the instruments and machinery during '97 for scientific purposes exported from the United States was $3,054,453, which was an increase of half a million dollars as compared with the exports in '96.

A Great Event.

In September last the *Miner* published the statement that the MINING AND SCIENTIFIC PRESS of San Francisco had suggested that there be a semi-centennial celebration of the discovery of gold in California by James W. Marshall at Coloma, El Dorado county, on January 19, 1848. At that time the *Miner* commended the suggestion and pointed out the good results that had followed the discovery of that historic nugget. It resulted in the building up of important empires on the Pacific coast on both sides of the international boundary line and gave a stimulus to all sorts of business on this continent, the good effects of which are felt even to this day. The suggestion of the San Francisco paper was warmly endorsed by the *Miner*, and the idea met with many commendations from some of the other papers of the coast. The suggestion was carried out, and never in the history of San Francisco was there a more hearty, widespread and spontaneous accord in the celebration of an important event than there was in this. The Golden City is noted for the fervor with which it observes the anniversaries of importance and is said to have outshone all previous efforts on this occasion. The finding of gold in California was as momentous an event to the people of the Pacific slope and the western part of the continent as was the landing of the Pilgrims on the eastern coast, and was more wide reaching and important in its effects. —Rossland, B. C. Miner.

Another Reminiscence.

TO THE EDITOR:—In your valuable paper of Jan. 29th, '98, page 108, par. 3, Mr. C. P. Stanford wishes to know who was the first inventor of the modern way of hanging up a stem. The invention was first made and put in use at the Reese mill, Sierra Buttes gold mine, by a German at work there in the early fifties. I think some of the early owners of that property would remember the name and date—perhaps Reese Bros. of your city.

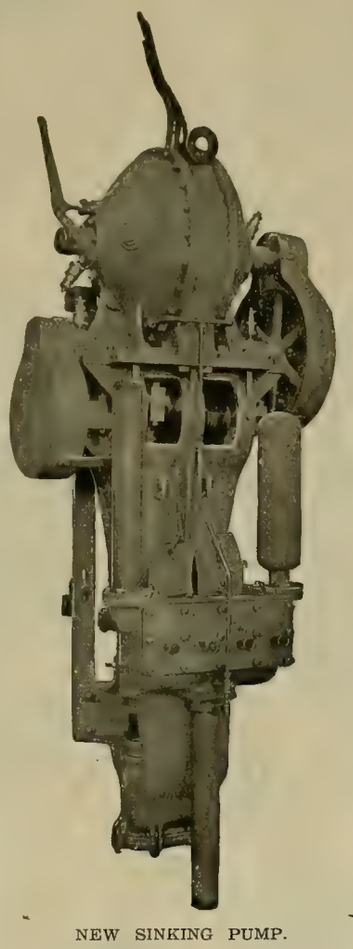
GEO. G. MORRISON.

Sierra City, Cal., Feb. 5th, '98.

REGARDING the description of the proposed Kern Co., Cal., electric plant in the issue of the 29th ult., a Mariposa correspondent writes that while the outline is correct, "the details do not fit. The proposal to establish turbines to develop 12,000 H. P. at first does not fit the Kern proposition. Modern practice rarely sets turbines under heads of more than 60 to 75 feet, but the average flow of the Kern in most years would have to be evenly distributed over the whole year and then doubled to give this power under 100 feet head. The company is to store the *winter flood* for the *dry summer season*, thus equalizing the flow and doing away with the present disastrous floods, etc. Yet the Kern hasn't any winter floods, and from November 1st to March 1st carries less than one-sixth the total flow of the year. The storing is to be done in reservoirs of a capacity of 42,000-acre feet, done over into gallons, which makes the figures look big. This will not prevent many floods, for the average June flow of the Kern would fill the reservoir once a week, and in the month of June, '84, would have filled it sixteen times. This reserve supply, according to the article, is to increase the river flow 50% during the dry season. In truth, it will not add 10%, during the dry months, to a flow less than half the claimed capacity of the installation. Just this mistake has been made in the new 5000 H. P. installation near Butte, which is on a stream flowing as low as 60 second feet at times; storage has been provided there, and similar claims are made, and the reserve supply is equal to supplying the deficiency for just thirteen days. The company has bought already two 1000 H. P. engines to set up in the power house, with duplicate steam plants already existing at Butte, where steam coal costs but $3 per ton."

Mine Sinking Pump.

A mine sinking pump, compact in form, of full rated capacity and efficiency, and not easily damaged by moisture or hard usage, has recently been constructed by the General Electric Company. The pump is one of the duplex double-acting type with outside packed plungers. Its cylinders are 5x6 in.; it runs at seventy-five revolutions per minute and has a capacity of 150 gallons against 300-foot head. It is driven by a specially designed 15 H. P. enclosed induction motor, in which the gears and all the mechanism are completely protected by a water-tight steel casing. The shaft and starting lever pass through stuffing boxes. The casing was tested for a leakage with steam



NEW SINKING PUMP.

pressure up to thirty-five pounds per square inch. The wearing parts are all large and of extra heavy design, the crank shafting being one solid forging fitted with brass bearings. The connecting rods are of the Marine end type and are forged. The guides are bored in the intermediate mechanism, so that the cross-head must always be in line with the pump cylinders. By removing one plate on the pump, all the valves may be reached at one time. This sinking pump was designed to withstand without injury all the hard usage to which mining machinery is subjected. As the case is water tight, the pump works as well under water as out. It may be completely "drowned" by a sudden inrush of water in the mine, but its operation is not affected. This pump is now in operation at Pachuca, Mexico.

CONCERNING the useful aspect of earthquake observations in Japan, it is now clearly recognized that ordinary engineering practice as applied to embankments, piers for bridges, tall chimneys, the framing of ordinary dwellings and other structures is to be avoided; and whenever, as, for example, after a disastrous earthquake or a fire, reconstruction is required, new methods are adopted, and the loss of life and property is being steadily reduced. The application of seismometry to measuring the irregular movements of locomotives has resulted in new forms of balancing the engines, with, among other incidents, a marked saving of fuel. By the use of seismographs along the coast of Japan, submerged areas of seismic activity have been mapped through which it would be dangerous to lay a cable. Instruments which record the unfelt movements of the earth's crust sometimes tell us that cable interruption is due to earthquake action so far from land that it cannot be felt by those on shore. These instruments, wherever they are established, give information of great seismic disturbances, even when they take place at the antipodes of the place of observation. Hence they enable us to correct, confirm, and even to disprove telegraphic information.

PROF. BURTON has published an interesting collection of statistics which prove the influence that magnetism is exerting in proving phenomena, which otherwise would be inexplicable. Among other things, he shows that in making a railroad running east and west, as many as thirteen steel rails will become crystallized and break, before one rail on a north and south track is similarly affected. This is due to the generation of magnetism by friction, and to the fact that in the former instance the polarity of magnetic current is resisted in the rush of the train; whereas in the latter case it is undisturbed.

A TRUE FLOATING DOCK may be described as a structure which utilizes its displacement for lifting a ship so much above its normal draught line as to bring the keel above the level of the water's surface. In the case of a graving dock the water is taken away from the ship, and in the case of a floating dock the ship is taken away from the water.

Coast Industrial Notes.

—D. Ward of Detroit, Mich., has bought 8000 acres timber land in Humboldt and Del Norte counties, Cal., for $80,000.

—The California State Board of Trade has adopted rules under which California will make an exhibit at the Omaha exposition. The two essential conditions imposed are that 10,000 feet of floor space in the exposition building, at Omaha, be donated free of cost, and that by April 1st $15,000 be in the hands of the Board of Trade, which undertakes to collect the exhibits.

—H. J. Crocker of San Francisco has bought almost the whole bond issue of the Sierra Railway Company of California. Of the total issue of $634,000 he takes $515,000. The road, which runs from Oakdale, Cal., to Jamestown, forty-three miles, was completed and commenced operating November 10th, '97. The bonds are 6 per cent forty-year gold bonds, secured by a first mortgage on the road and its equipment, and a sinking fund of 5 per cent of the annual net earnings is provided for.

The Secretary of the Treasury has made a ruling that bullion produced in bond from imported ores and transported from a bonded smelter for refining need not be weighed or assayed on entry for rewarehousing, since the quantity to be charged with duty on such entry must be equal in every case to the quantity so charged on the transportation entry, so that the warehousing bond cannot be canceled otherwise than on the exportation of or payment of duty on 90 per cent of such quantity.

—At Salinas, Cal., the new beet sugar factory and refinery will be of unusual dimensions. Main building—582 feet long, 102 feet wide, 5 stories high; contains 3500 tons of steel, 4,000,000 bricks and 800 squares of slate. Boiler house—559 feet long, 68 feet wide, 22 feet high; contains nearly 1,000,000 bricks, 12 boilers, 4 economizers, 2 steel smokestacks 216 feet high, 13 feet in diameter; each stack with base weighs 1000 tons. Machine shop and carpenter shop—559 feet long, 40 feet wide, 22 feet high; contains about 600,000 bricks. Water required to keep mill running, 18,000,000 gallons per day. Will consume about 1200 barrels of oil per day of twenty-four hours, or its equivalent in wood or coal; will cut 3000 tons of beets per day of twenty-four hours. Sugar—Will produce about 450 tons of sugar daily.

—Los Angeles, Cal., reports that the price of oil remains at $1 a barrel, with increasing demand. The Oil Producers' Trustees report having concluded contracts last week for the delivery to six oil-consuming firms of Los Angeles of 150,000 barrels of oil. In no single case of the six contracts does the period of delivery for the quantity of oil contracted for extend beyond one year, and in one case the quantity called for in the contract is to be delivered within three months. They also report having made an agreement with firms in San Francisco for the delivery of 60,000 barrels of oil within one year from February 1. The contracts with these San Francisco firms give the latter the privilege of contracting for an additional 60,000 barrels for delivery within the same period, and it is believed that contracts for that additional quantity will be signed during the present week. These deliveries in San Francisco will be in addition to contracts already in force, and which call for an average of 10,000 barrels a month.

Personal.

I. L. MOORE is Supt. Lucky Marion at Greenwood, Cal.

THOS. FERGUSON is Supt. Crystal mine, Marysvale, Utah.

J. K. WOLKOTTE is Mgr. Gladstone mine, French Gulch, Cal.

R. K. HOWK is managing owner of the Mt. Shasta mine, Shasta, Cal.

F. W. WILMANS, Pres. Rose Bud M. Co., has returned to Sonora, Cal.

JOHN SHANKS is Mgr. of the Rich Hill M. & M. Co., Cœur d'Alene, Idaho.

H. ZADIG announces his intention to leave next month for the Klondike.

W. P. BLAKE of Tucson has been appointed territorial geologist of Arizona.

C. E. UREN, Supt. Allison Ranch mine, Grass Valley, Cal., is in San Francisco.

WM. MADDEN of the Brunswick mine, Grass Valley, Cal., is in San Francisco.

H. L. SWAIN, Supt. Ibarra mines, Calmalli, Mexico, has gone to Santo Domingo.

J. E. SENTON, Supt. Grover Cleveland mine, Placerville, Cal., is in San Francisco.

J. M. BUFFINGTON, Supt. La Suerte mine, Nevada City, Cal., is in San Francisco.

J. C. DIAMOND, Mgr. Limpensel mine, Placerville, Cal., was in San Francisco.

L. R. POUNDSTONE, Supt. Oro Fino mine, Shingle Springs, Cal., is in San Francisco.

F. T. FREELAND is succeeded by G. B. Kilborn as Mgr. Isabella mine at Cripple Creek, Colo.

H. APPEL, Mgr. and part owner of the Mariposa mine at Alleghany, Cal., is in San Francisco.

M. W. MATHER, Supt. Plumbago mine, Alleghany City, Cal., has returned from New York.

CAPT. MCCLINTOCK, Supt. Rhode Island and Philadelphia mines, Sonora, Cal., is in San Francisco.

GEO. SCHMITT, Mgr. National mine, Redding, Cal., has returned to the mine from San Francisco.

DANA HARMON, Supt. Gaston Ridge mine, Graniteville, Cal., has returned to the mine from San Francisco.

FRANK PANTER, owner of the Evening Star mine, Whitehouse, Cal., has returned home from San Francisco.

COL. COLES, Mgr. Montauk mine in El Dorado Co., took charge this week. His headquarters are at Auburn, Cal.

F. BOECKMAN, Pres. Providence M. Co., Nevada City, Cal., has returned to San Francisco from a visit to the mine.

J. C. WRIGHT of Indianapolis, Ind., principal owner of the Grand Victory mine at Placerville, Cal., is in San Francisco.

J. H. NEALE, owner of the Sugarman mine, at Sonora, Cal., has charge of the Tuolumne county exhibit at the Golden Jubilee Fair.

DR. A. SCHIEDEL, the Australian representative of the New Zealand Mines Trust, is visiting the upper and lower Thames fields.

Recent California Mining Incorporations.

North Alaska D. & T. Co., San Francisco; capital stock $100,000, subscribed $70; J. L. Du Frane, J. G. North, J. Leale, W. G. Leale, A. W. Wehe, A. A. Anderson, M. Marcus.

Free American M. Co., San Francisco; capital stock $250,000; subscribed $5; O. E. Moore, W. Dennis, W. C. Alberger, C. H. Street.

North British M. Co., San Francisco; capital stock $100,000; subscribed $1000; T. H. Douglas, G. Williams, A. Lome, C. Chapin.

Monte Cristo M. Co., San Francico; capital stock $250,000, subscribed $50; G. M. Ward, P. Harvey, E. E. Harlow, F. H. Gould.

Tricolor Con. M. Co., Tuolumne county; capital stock, $5,000,000; C. S. Long, C. C. Hamilton, W. G. Long, C. W. Everett.

Recently Declared Mining Dividends.

Portland G. M. Co., Colorado, 1 cent per share, $30,000; payable Feb. 15; total to date, $1,327,080.

Anchoria-Leland, Colorado, 1 cent per share, $6000; payable Feb. 15; total to date, $114,000.

Sacramento, Utah, $5000; payable Feb. 28.

Silver King, Utah, $37,500; Feb. 7; total to date, $1,425,000.

Champion M. Co., California, forty-sixth dividend of 25 cents, $8500; payable Feb. 15.

Atlantic Copper M. Co., Michigan, $1 per share, $40,000; Feb. 5.

Boston & Montana M. Co., $3 per share, $450,000; payable Feb. 19.

Quincy Copper M. Co., Michigan, $3 per share, $300,000; payable Feb. 15.

Obituary.

HUGH MATHESON, president of the Rio Tinto M. Co., died in London last Tuesday.

H. B. HAVENS, president of the Gould & Curry and Utah mining companies and of the Kincaid Mill Co., died at his residence in San Francisco last Thursday, aged forty-five years.

Books Received.

"*The Planning and Construction of High Office Buildings*," by William H. Birkmire, 346 pages, 4to., unusually well printed, with handsome illustrations, half-tones, shop drawings, etc.; of value to all, but of special interest to architects and builders; supplementary to the author's former work, "Skeleton Construction in Buildings." The contents of this book are the practical experience of a practical man and are of value. The subject is one that is of immediate concern to all city residents; the high office building is here to stay. The latest and in many respects the best illustration of its value is afforded by the recent construction of the Claus Spreckels Building in this city. Every detail of the building of a twenty-story building from the first step in the construction of the pneumatic caisson to the copper flashing on the roof is herein set out in detail by a man who has made such construction his life work. Published by John Wiley & Sons, New York City. Price $3.50.

"*A Manual of Mining*," 548 pages, by M. C. Ihlseng, third edition, being a condensation of a course of lectures upon mining delivered at the School of Mines in the State of Colorado, designed as an elementary treatise for the use of those desiring a reference book; the subject being brought to the close of the year 1897. The author has drawn from the best sources and made a valuable compilation on methods of mining, with intelligent comment. Considerable space is devoted to ventilation and hygienic requirements; and the chapter on timbering—which, like the rest of the book, is elaborately illustrated—is of considerable practical interest. The book is more for the non-metalliferous than for the metalliferous miner, but contains considerable of practical value to all underground workers. Published by John Wiley & Sons, New York City. Price $4.

"*A Description of Minerals of Commercial Value*," D. M. Barringer, oblong, morocco binding, 168 pages; an admirably arranged and valuable reference book for practical use, giving the maximum of information with the minimum of words. Published by John Wiley & Sons, New York City. Price $2.50.

Commercial Paragraphs.

THE E. P. Allis Co. has received an iron medal from Trieste, Austria, made from the first piece of pig iron ever manufactured in Europe with Milwaukee machinery. About six months ago the Allis Co. made two blowing engines for an Austrian firm, each costing $30,000.

THE Westinghouse Electric and Manufacturing Co. have shipped a trainload of electrical apparatus to the Dyea Klondike Transportation Co., which will be used for the operation of an electric rope tramway across the Chilkoot pass. This is the first consignment of electrical machinery to go to that region.

DR. NELSON of Milford, Utah, placed an order with the Colorado Iron Works Co. for a 10-stamp gold amalgamating mill, to be erected at that place. The power for this plant will be sufficient to run twenty stamps. The Colorado Iron Works Co. are Western agents for the Erie City Iron Works engines and boilers, and will furnish the engine and boiler of their make for this plant.

MR. A. MIDDLEBROOK, the Denver Mgr. of the Jeanesville Iron Works Co., reports building two large compound condensing mine pumps for Japan, three electric-driven mine pumps for South Africa, one large compound condensing pump for the coal mine at Cumberland, Md., one for the D. L. & W. Railway Co., one for the Canudy Coal & Railway Co., Nova Scotia, two for the Ibex mines, Leadville, Colo., and a good many smaller sizes.

THE Best Manufacturing Co. of San Leandro has just sold one of its largest traction engines, with complete outfit of wagons, to the DeLamar Mining Co. of Utah. It will be used for hauling ore a distance of seventeen miles, and it is calculated to save 50 per cent as compared with the present system of transportation by mule power. A single engine will haul a load of fifty tons at the rate of three miles per hour on ordinary country roads.

THE exhibit of silver-plated copper amalgamating plates, for saving gold in quartz and placer mining, made by the Denniston San Francisco Plating Works, 653-655 Mission St., E. G. Denniston, proprietor, at the Golden Jubilee Fair, is a fine one. For thirty-five years this establishment has manufactured these plates and their reputation is world-wide. Awards made for silver-plated amalgamating plates have been given to the Denniston San Francisco Plating Works. Every description of metal goods is plated with gold, silver, nickel, copper, brass, bronze, etc. A visit to these works will repay those who are desirous of seeing the process of depositing metals by electricity.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BICYCLE GEAR CHANGING MECHANISM.—Willard B. Featherstone, San Francisco, Cal.; assignor to the Lo-Hi Sprocket Co. No. 598,336. Dated February 1, 1898. This invention relates to a device which is especially adapted for changing the gears upon bicycles, tricycles, or any vehicle to which the device can be applied, so that the speed of the driving mechanism can be changed from a higher to a lower, and vice versa. It consists essentially of a crank shaft having a pinion fixed thereto, a disk exterior thereto having two different diameters, one of which forms a clutch to engage the pinion when both have a common center of rotation, and larger internal gearing at one side of the clutch flange; a disk eccentrically pivoted to the frame concentric with and forming a bearing about which an exterior sprocket wheel is turnable, lugs by which the sprocket wheel is connected with the internally toothed disk and a mechanism by which the disk is moved endwise upon its shaft so as to first disengage the smaller circle of teeth upon the pinion, and, secondly, to turn the eccentric disk about its fulcrum point to engage the larger internal teeth of the disk with the pinion and produce a slower movement.

BRUSH-HANDLE SCRAPER ATTACHMENT.—Anthony W. Permento, San Francisco, Cal. No. 598,349. Dated February 1, 1898. This invention relates to an improved scraping attachment for brushes and similar articles, the object of which is to enable the user to scrape and clean paint or to clean mud from shoes before blacking, and other similar purposes. It consists essentially of a handle with a slot or channel made in the end, a blade slidable in the channel and conforming substantially in outline to the shape of a handle, cam-shaped slots in the blade and pins in the handle engaging the slots so that the blade may be moved longitudinally and also transversely to project its end beyond the end of the handle, and its edge beyond the side.

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Office and Address, 9 Geary Street, San Francisco, Cal. (Junction Kearny and Market.)
Send for Measure Blanks for Self-Measurements; free to any address on application. Commissioned by U. S. to furnish Limbs on Government Orders. Artificial Limbs Repaired with Skill and Dispatch.

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HAS FOR SALE CHEAP
A First-Class Air Compressor (Steam Driven) and Drill (New), also Three-Ton Capacity Pulverizer.
59-61 FIRST STREET,.....SAN FRANCISCO.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING FEBRUARY 1, '98.

598,466.—PUMP—R. Addison, Pasadena, Cal.
598,172.—TELEPHONE—Barron, Reid & McDonnell, Tacoma, Wash.
598,354.—WINDOW SHADE FIXTURE—G. Biehn, North Yakima, Wash.
598,412.—OFFSET MECHANISM—F. W. Cook, Placerville, Cal.
598,364.—CUTTERHEAD—F. E. Dalzell, S. F.
598,474.—MUCILAGE BOTTLE—P. E. Daniels, Oakland, Cal.
598,336.—BICYCLE GEAR—W. B. Featherstone, S. F.
598,177.—TRUSS—F. Fette, Collegeville, Cal.
598,146.—PROSPECTING TOOL—E. S. Glover, S. F.
598,084.—ORE FURNACE—L. D. Godshall, Everett, Wash.
598,419.—AUTOMATIC PIANO PLAYER—F. R. Goolman, Los Angeles, Cal.
598,340.—FLUX—G. Hammond, S. F.
598,341.—SOLDER—G. Hammond, S. F.
598,347.—AIR BRAKE COUPLING—J. C. Look, San Jose, Cal.
598,348.—AIR BRAKE COUPLING—J. C. Look, San Jose, Cal.
598,227.—VAULTING GATE—I. E. Marshall, Martinez, Cal.
598,382.—BRACE—J. H. Morrison, Prescott, A. T.
598,386.—AIR VALVE—T. A. Noble, Seattle, Wash.
598,388.—MUCILAGE HOLDER—F. F. Peek, Susanville, Cal.
598,349.—BRUSH HANDLE—A. W. Permento, S. F.
598,183.—TELEPHONE—Reid & McDonnell, Tacoma, Wash.
598,294.—FIRE ESCAPE—J. Robbins, Portland, Or.
598,127.—COMPOSITE TIMBER—H. F. Williams, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

TEN WEEKS FOR TEN CENTS!
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WANTED.—Position to take charge of a quartz mine. Am a practical miner, and have had charge of a number of properties in different States for the last 20 years. Can furnish the best of reference. Address J. D., Mining and Scientific Press.

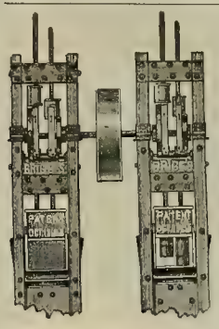
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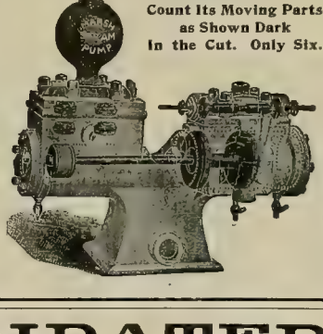
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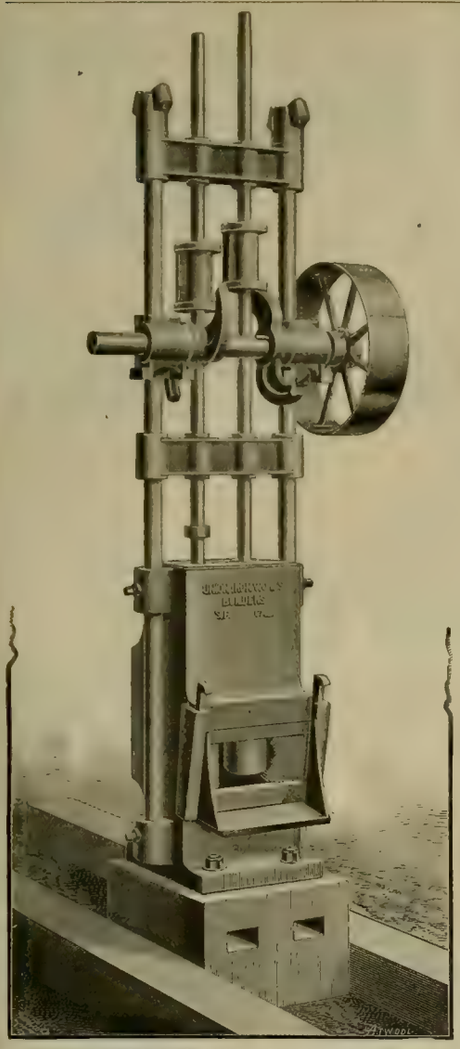
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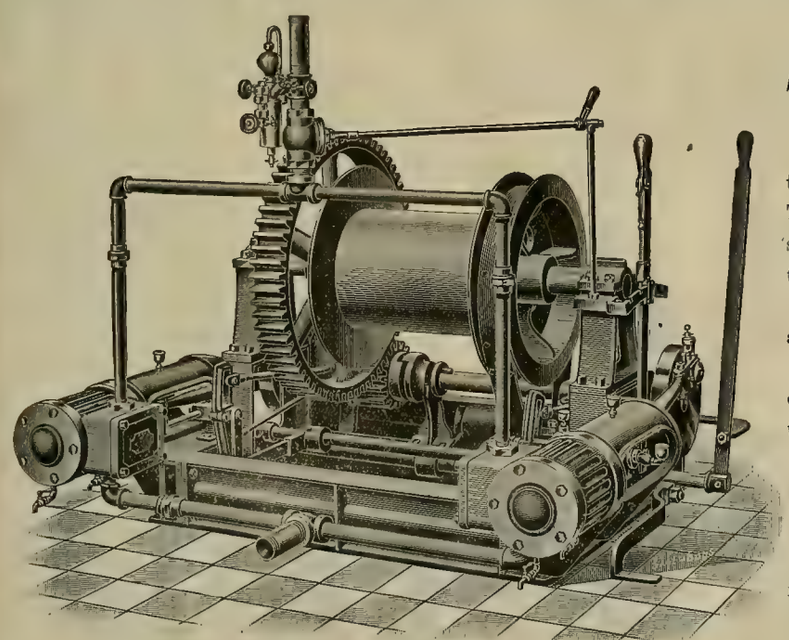
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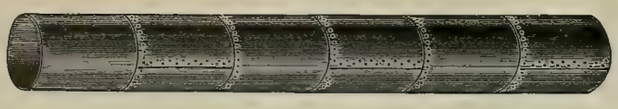
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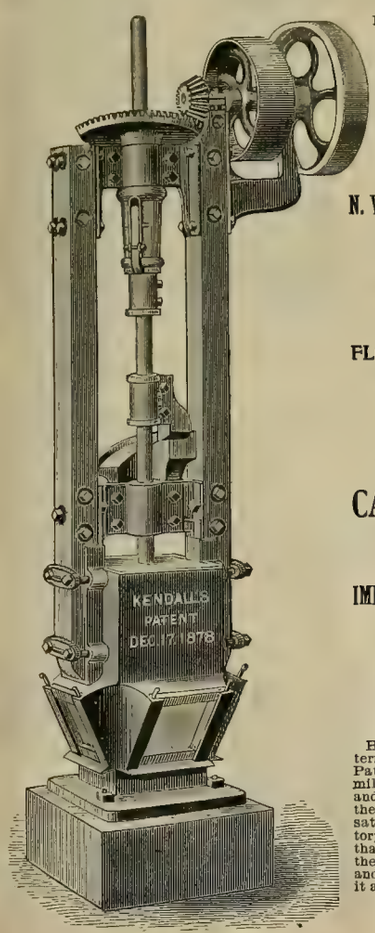
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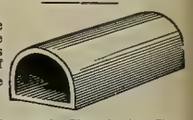


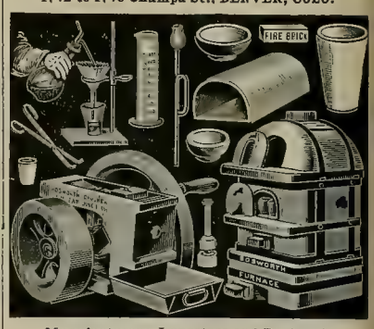
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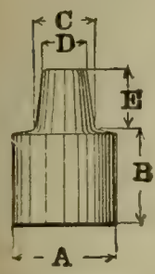
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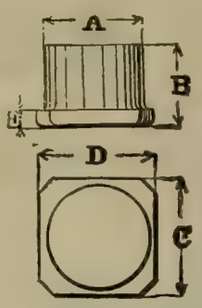
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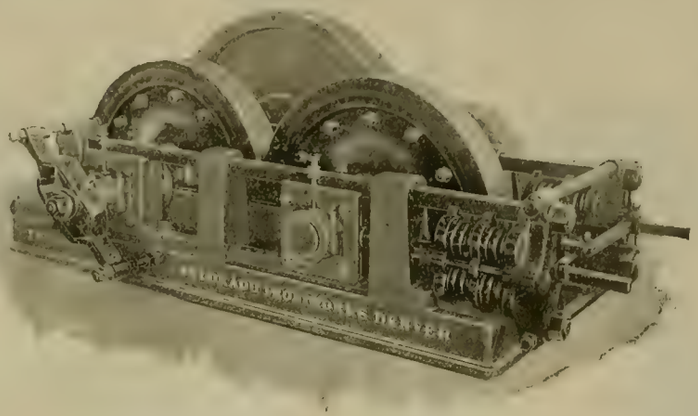
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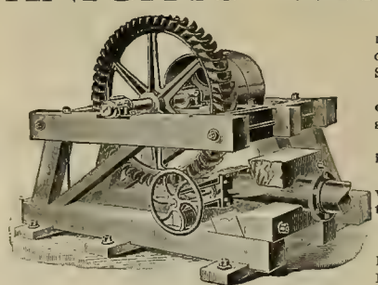
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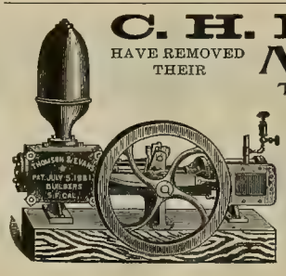
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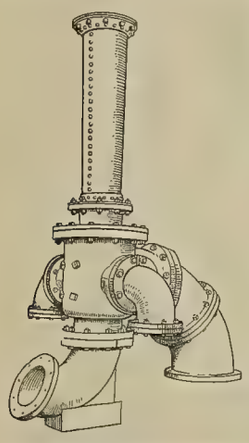
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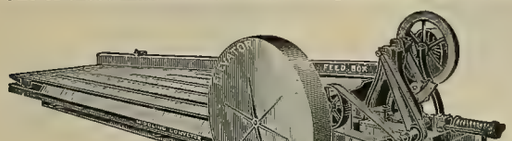
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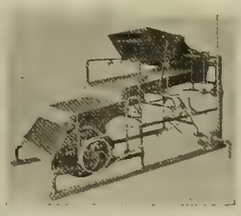


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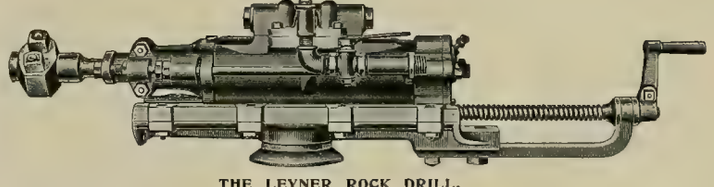
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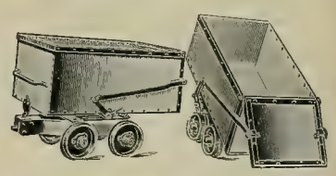
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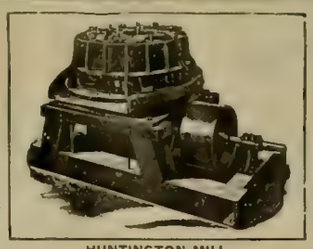
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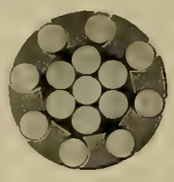


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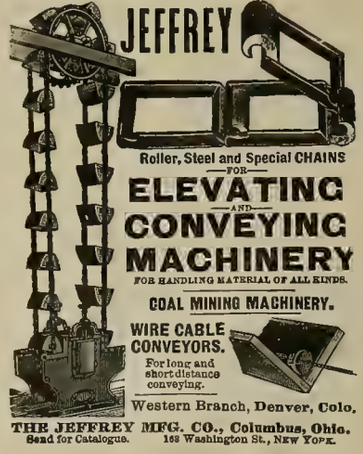
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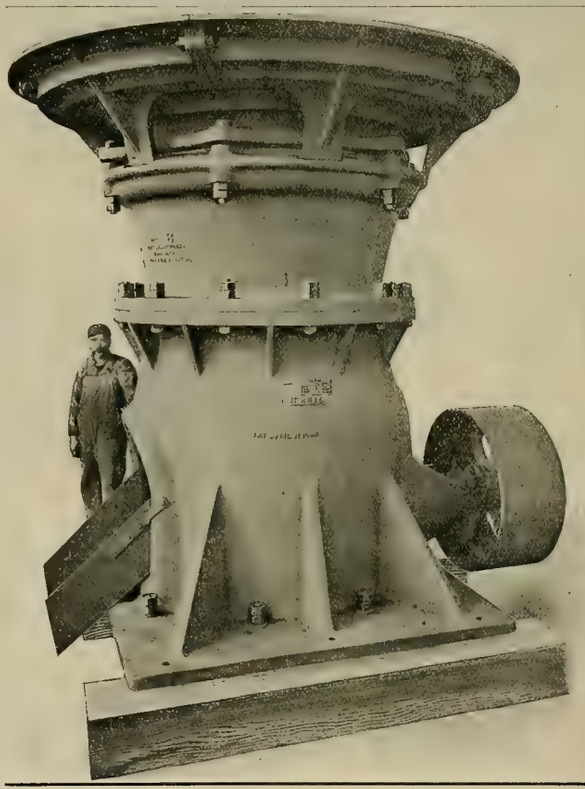
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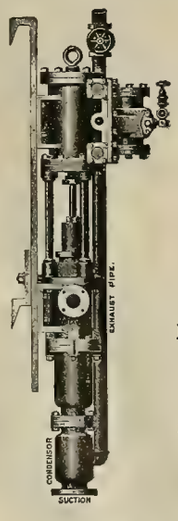
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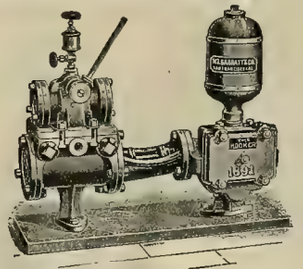
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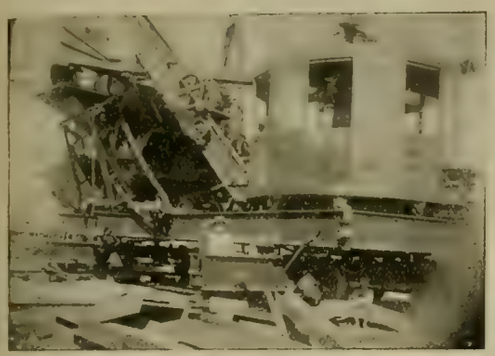
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These plants, being the outcome of many years of evolutionary experiment in the field of their actual operation, are constructed in the most thoroughly substantial and workmanlike manner, of the best material the market affords, with a view to their maximum efficiency, strength and durability; the operating portions almost exclusively of steel, to gauge, and therefore interchangeable, and having been thoroughly tested as to all points, under widely varying conditions, are fully warranted to perform as indicated in the following table:

FOR "GULCH," "BAR" AND "HILL" DIGGINGS.

Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
1 ..	2500	2 to 4	25 to 150	150 tons	Single operating plant
2.	5000	2 to 3	50 to 300	200 tons	Duplex operating plant
3 .	7500	2 to 2¼	75 to 450	300 tons	Triplex operating plant

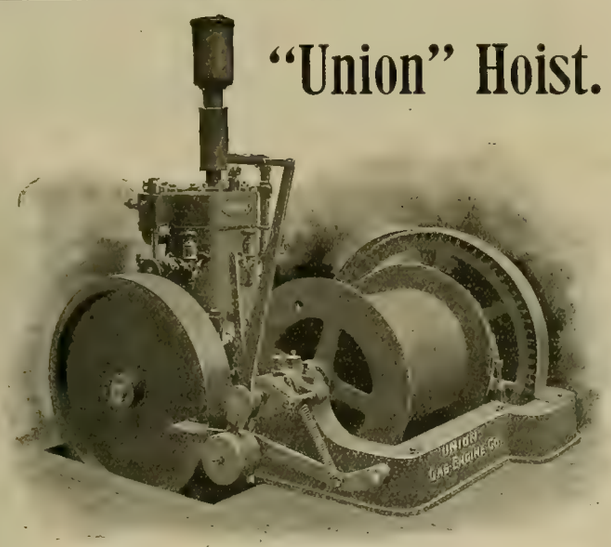
SWAMP AND RIVER-BED PLANTS.

Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
4...	2500	2 to 4	Barge	250 tons	Single amalgamator
5...	5000	2 to 3	Barge	325 tons	Duplex amalgamator

In general terms it may be said these plants consist of the electrically operated dredge and amalgamator, mounted either on steel barges for swamp or river-bed mining, or steel-bodied cars for "gulch," "bar" and "hill diggings," together with the necessary power plants for their operation. Several operating plants, either in close proximity or scattered over a large district, may be operated from a single power station, which may be situated at any convenient point within a radius of a few miles, at railroad depot or where water power can be utilized. The river plants, complete in themselves (each barge containing its own power), are made single or duplex: any suitable number of either can be operated on a river, each independently working its allotted section from surface to bedrock, and rim-rock to rim-rock. All these plants are built with a view to easy transportation, in "knock-down" shape over ordinary mountain roads, and, on special order, the size and weight of separate parts may be still further reduced. In the foregoing table the figure representing the smaller quantity of water required applies to cases where, for any reason, it is desirable or necessary to use the water over and over. The water required may be taken from below the placer, thus obviating the necessity of long ditches, etc. Since these plants neatly pile their debris on the cleaned-up bedrock of the ground worked, they may be said to create their own dump, and hence are enabled to successfully operate on flat ground, or where ordinary dumping facilities are lacking. This peculiarity also renders them independent of "debris laws." The wonderful perfection with which these plants extract the finest, microscopic particles, such as are held in suspension in water, or, when dry, ascend in a gentle current of air, constituting in bulk a perfectly impalpable powder (send for samples), renders them particularly valuable and indispensable in cases where, owing to the fineness of the golden particles, very rich mines are unavailable for profitable working by the hydraulic or sluice processes.

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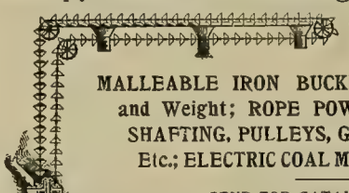
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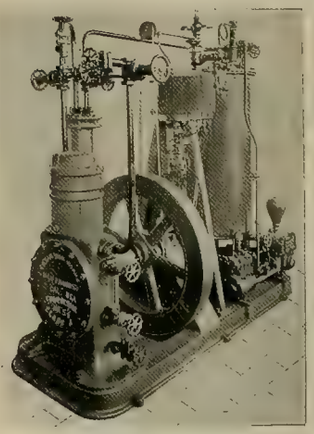
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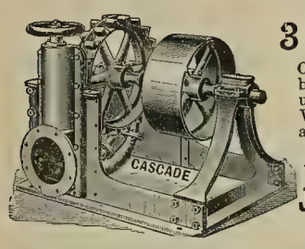
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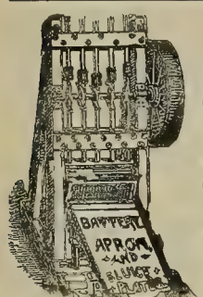
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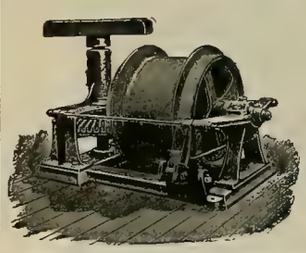
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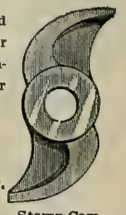
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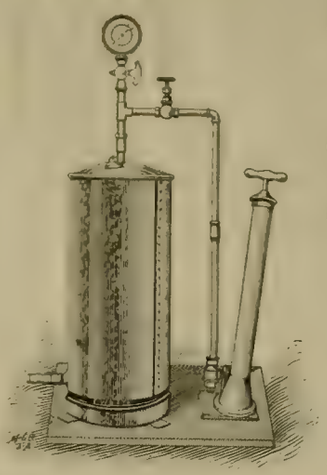
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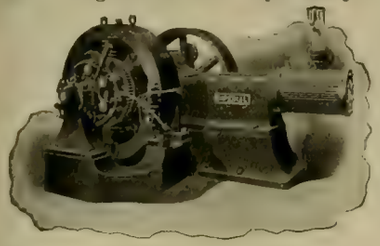
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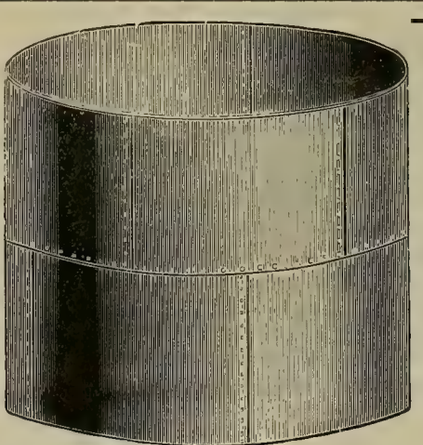
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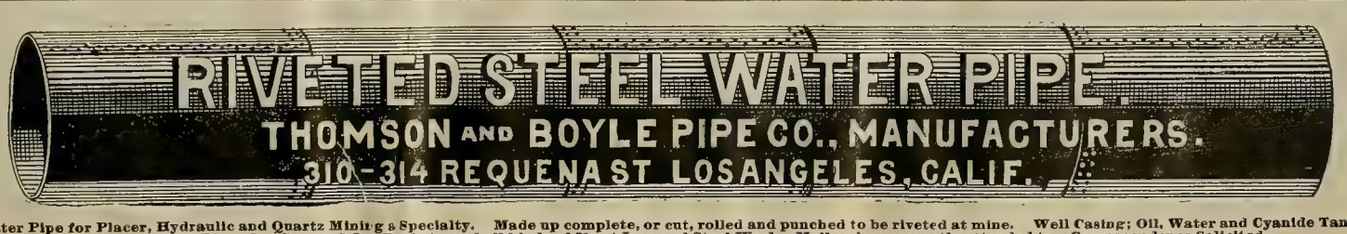
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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 10, 1898.

General trade continues fair, with the call from up north exceptionally good. The increase from British Columbia, Washington and Oregon is due to the growing demand by outfitters for Alaska and Northwestern Territory. The rush of persons bound for the gold fields there is not only early and very heavy but is increasing. From the tenor of advices given out by railroad and transportation companies on this coast and at the East there will be from 80,000 and up of persons that will go there this year. To transport them there will be large additions to the fleet of vessels in the Alaska service. As near as the writer can learn there will be from eight to twelve large steamers to arrive from the Atlantic which will go into service. Aside from these quite an addition is being made to the fleet by putting steamers on this coast into service.

General rains the past week broke the drouth and also caused a flow of water in mining districts mostly in need of it. The growing weather since the rains has caused a more cheerful feeling, and with the usual rains from now on will insure very large crops of all kinds of farm products. With this assurance there will be more disposition to place loans on farms and other outside propositions. The steadily increasing disbursements of funds by persons bound for the Klondike adds still more to the large sums held by banks. It is estimated by conservative persons that the amount which will be disbursed by Klondikers will average from $500 to $800. If estimates of the number of persons who will go there this year are correct, then there will be expended at San Francisco and other shipping ports from $40,000,000 and upwards. This looks preposterous. Even if one-half is disbursed, it will add very materially to the idle money here and keep the rates of interest down. It ought to stimulate speculation and investments.

New York Silver Prices.

NEW YORK, Feb. 10. — Following are the closing prices for the week:

	—Silver in— London.	N. Y.
Friday	26 1-16	56⅛
Saturday	26¼	56¾
Monday	26¼	56¾
Tuesday	26 1-16	56⅜
Wednesday	26 1-16	56⅜
Thursday	26 1-16	56⅛

	Copper.	Lead.	Iron.	Tin.
Fri.	10 90 @11 00	3 60	10 00@12 00	13 92½
Sat.	10 90 @11 00	3 57½	10 00@12 00	13 87½
Mon.	10 90 @11 00	3 60	10 00@12 00	13 92½
Tue.	10 90 @11 00	3 62½	10 00@12 00	13 90
Wed.	10 90 @11 00	3 65	10 00@12 00	13 92½
Thur.	10 90 @11 00	3 65	10 00@12 00	13 92½

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.82¾
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	56½
Mexican Dollars nominal	46@—

SILVER.—The market hung around at low prices throughout the past week. There seems to be an entire absence of any move indicating a demand, either in this country or abroad, other than for legitimate wants. From England our advices are to the effect that with the spring trade there will be an improved call for the white metal, owing to the several nations not having enough to meet much of an increase in general business. It is believed, also, that the Orient will take more. The last steamer hence for Hongkong took out $95,000 in bullion for Hongkong and $42,100 for Bombay.

MEXICAN DOLLARS.—The market is quiet, with prices lower and weak. The last steamer for Hongkong took out $14,409.

COPPER.—The market continues to hold steady at full figures. Eastern advices indicate that the demand is siowly increasing. A New York letter says: "The export movement, particularly to the Continent, is keeping up remarkably well, but prices hold fairly firm, and surface indications are that the large quantity of metal sent from the United States is not more than covering the amount consumed, if, indeed, even doing that. The home trade demand is only fair, however, although improvement is noted in some lines of manufactured goods."

Our market is quoted as follows:

Ingot casting, jobbing	— @13
Ingot " wholesale	— @12½
Sheet copper	— @16½
Bolt ¼ and 5-16, 20c; ⅜ and larger, 16½	

TIN.—In the general situation of the market there is nothing new. There is some decline on sales to arrive of both plate and ingot. For plate the market is irregular.

The market is quoted in jobbing lots as follows:

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, "	4 00@—

LEAD.—The market at the East went off but was slightly stronger towards the close. Concessions are obtainable on quotations in our market.

Pig	4 75	@	5 00
Sheet		@	6 50
Pipe	5 30	@	5 80

QUICKSILVER. — The market is quiet. Shipments the past week by sea were 106 flasks to Mexico and ten to New Zealand.

Our market is quoted at $39 for domestic consumption and $35@36 for export to the west coast of Mexico.

IRON.—In our market, and also up north, the consumption of pig is liberal. The East reports a spasmodic demand and, as there is keen competition, selling prices have shaded off.

AMERICAN.	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50
ENGLISH.		
Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

SHOT.—The market is easy at quotations.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

COAL.—The higher prices asked are causing free shipments to this State of Rocky Mountain coal. This promises to be quite a factor. With lower temperature the consumption of house coals is falling off. Receipts of coal for the week ending with Tuesday were as follows in tons: Departure Bay, 4641; Newcastle, N. S. W., 13,818; Nanaimo, 4233; Coos Bay, 800; Swansea, 2540; Puget Sound, 14,950. Total, 40,982 tons.

SPOT FROM YARD—PER TON.	
Wellington	$10 00@— —
Greta	6 50@— —
Nanaimo	8 00@— —
Gilman	6 50@— —
Seattle	6 50@— —
Coos Bay	5 75@— —
Cannel	10 00@— —
Egg, hard	13 00@— —
Wallsend	9 00@— —
TO ARRIVE—CARGO LOTS.	
Australian	6 25
Liverpool Steam	7 00
Scotch Splint	— —
Cardiff	— —
Lehigh Lump	12 00
Cumberland, bulk	9 00
Egg, hard	10 50
West Hartley	7 25

COKE.—Imports the past week aggregate 244 tons from Liverpool.

The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	— —	@	— —
" spot, in bulk	11 00	@	— —
" in sacks	12 00	@	— —
Cumberland	10 00	@	— —

PLATINUM.—The market is steady.

Our market is quoted in a jobbing way at $15 per ounce and for scrap $10 an ounce.

BORAX.—The market is firm, with free shipments to the East, where there is a scarcity.

The market is quoted as follows:

Refined, in carload lots, in barrels	7
Refined, in carload lots in sacks	6¾
Powdered, in car lots	7
Concentrated, "	6¼

ZINC.—The market is steady.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 45 to 50 cents per pound for ingots.

ANTIMONY.—The market is steady.

POWDER.—The market is steady at current quotations.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9 to 11c, according to strength and quantity.

Chemicals.

There is a fair distributive demand for the season. Two cargoes of nitrate of soda came in the past week. New York mail advices state that there is a fair demand for all kinds, with quotations unchanged.

CYANIDE OF POTASSIUM.—The market is steady.

Our market is quoted for chemical pure 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The market is firm.

We quote in a jobbing way at 1¾c per lb for 66%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6¾@7c per pound in carboys.

BONEASH.—There is a fair export movement.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3¼c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady.

We quote in a jobbing way at 4c per pound.

SPELTER.—The market is steady.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is firm.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—The market fluctuates for round lots, but is steady for small.

Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alpha Con M & M Co, Nev	20	5c	Feb 1.	Mar 8. Mar 29.	C E Elliot, 309 Montgomery
Baliol G M Co, Cal	2	30c	Jan 26.	Mar 4. Mar 28.	R L Cheney, Mills Building
Chollar M Co, Nev	45	20c	Jan 8.	Feb 11. Mar 8.	C E Elliot, 309 Montgomery
Fall River Con G Q Co, Cal	11	5c	Jan 15.	Feb 25. Apr 21.	A Lorsbach, 313-315 Front
Marina Marsicano G M Co, Cal	12	9c	Jan 3.	Feb 7. Feb 28.	Chas Bovone, 217 Sacramento
Mexican G & S M Co, Nev	58	15c	Jan 6.	Feb 10. Mar 3.	Chas E Elliot, 309 Montgomery
Orleans M Co, Cal	7	10c	Feb 1	Mar 8. Mar 28.	Geo O Thurston, 575 Mission
Overman S M Co, Nev	79	5c	Jan 26.	Mar 2. Mar 23.	G D Edwards, 414 California
Potosi M Co, Nev	49	20c	Feb 5.	Mar 11. April 4.	C E Elliot, 309 Montgomery
Red Cap M Co, Cal	2	$5	Nov 29.	Jan 6. Feb 26.	H H Martin, 125 Beale
Savage M Co, Nev	94	20c	Jan 6.	Feb 8. Feb 28.	E B Holmes, 309 Montgomery
Sierra Nevada S M Co, Nev	114	20c	Jan 19.	Feb 23. Mar 14.	E L Parker, 309 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19.	Feb 26. Mar 21.	A F Frey, Phelan Building

Mining Share Market.

SAN FRANCISCO, Feb. 10, 1898.

The market fluctuated the past week to lower figures for the entire line except Hale & Norcross, Occidental, Standard and Sierra Nevada. The decline in Con. Virginia to 86 cents, although looked for by the better informed, caused lower prices along the entire line with the exception of those noted above. Several assessments became delinquent, but were not carried. The market acts more than ever as if a good-sized deal is on the tapis and that the inside is manipulating for it. If this opinion is correct, then it should not cause surprise if prices go still lower, particularly of the more desirable. Preceding every deal in mining shares, prices have been sent to very low figures, work procrastinated, bear points put out. The manipulator for the inside pool makes lower prices by cross-orders, which bring in chippers who help in the decline, and which is aided still more by margin shares coming in. It has been years since such times were more propitious for high prices. Money is plentiful, and the public throughout the country are ripe for a gamble; but it will take ore and honest management to get the richer class in, both of which can be done when desired by the moneyed pool. The excitement about the Klondike will also help, particularly if large amounts of gold come from there this summer and fall. From all we can learn, the work in the mines is of a character which encourages the belief that before the fall months, most important results will follow. It may be possible in one or two before the spring months pass. It is well known in mining circles that, above the water, good grade ore, mostly gold bearing, has been found; and work for many months, and in two cases several years, has been done, not to develop it, but to tire the public out of their holdings by assessments and making false moves in the share market. While it is desirable to pump out the mines, which will be done in time to resume deep mining, yet the impression that there is no body of good grade ore above the water level is entirely wrong, which will be proven by time.

The news from the Comstock mines points to more active work in several and good results in others, yet it will take time, or until shares are better concentrated. Reports—and seemingly correct, too—are out that on the 1650-foot level important work will be started soon. In Sierra Nevada the ore found is quite important. So far as prospected, it goes about $40 a ton, with 75 per cent gold. It will take two weeks to make connections for air and manway by an upraise, after which the level will be exploited to find the extent of the ore. In Alta prospects are improving, which encourages the management in the belief that a body of good ore may be uncovered. Fair progress is being made in the north drift in Utah. Soft porphyry is being passed through. In Sierra Nevada they are raising from the Riley tunnel to make connection for air and other purposes. With this completed, exploiting this level will be in order, as will extracting ore. The official letter reports taking out eighty-three tons, assaying from $30 to $40 to the ton. The impression prevails with some that this body of ore will be found from 20 to 30 feet wide, yet it may not average so much all the way through. West crosscut No. 5 on the 900-foot level is being pushed ahead at the rate of over 20 feet a week. Work is continued in the north drift on the 900-foot level in Union. The face shows porphyry, vein matter and clay seams. The letter from Mexican reports work only on the 1000-foot level going east. In Ophir crosscutting to the west is being done on the 1000-foot and Central tunnel levels. It seems as if they ought to be nearing the west ledge on the former level. In Con. Virginia work is confined to and around the 1550-foot, 1650-foot and 1750-foot levels. The official letter does not report any material change, but it is understood that since Mr. Flood's return from consulting with J. W. Mackay, word has gone to Virginia City to start more important work in that mine at an early day; but, before it is done, an assessment will probably be levied by Ophir and also Con. Virginia. Work is continued by Best & Belcher and Gould & Curry on the joint east crossdrift on the 800-foot Bonner shaft level. The work in Savage ought to attract attention before long. Nothing doing in Hale & Norcross. In Chollar they are getting ready to resume work to the west on the 550-foot level. They will find ore, unless the work in the crossdrift is stopped. All repairs are said to be completed with the Sutro tunnel on the 1600-foot level. In Potosi no change is reported in the work under way. They are milling the accumulated ore. In Bullion they are still repairing the old Crœsus shaft. Procrastinating work is still the order in Alpha and will probably continue to be until the assessment is off. The surface tunnel in Con. Imperial is in about 500 feet, and the joint Challenge, Confidence and Con. Imperial west crossdrift is in nearly 1800 feet. The flow of water is still quite strong. Nothing new from Challenge and Confidence. In Yellow Jacket the work that is being done is said to be in the right direction, but it is being done so as to kill time, and it will take many weeks to strike ore, even if the work is not stopped. In Crown Point they are raising from the end of the south drift, 750-foot level, and saving some low-grade ore. The joint raise with Belcher from the 850-foot level is up over 80 feet. In Belcher they are cleaning out the north drift on the 1200-foot level. They raised last week thirty-seven tons of ore, assaying $26.59 a ton. In Alta an improvement is reported on the 950-foot level. From Justice nothing new is reported. A few tons of ore are raised, assaying about $20 gold and $12 silver to the ton.

On the Brunswick lode interest centers largely in Potosi in the work on the 600-foot level, towards Occidental. On this level the west crossdrift ran into a well-defined ledge about 35 feet wide, when the work was turned south so as to see what it would lead to. At last advices the ore assayed about $4 and was seemingly improving. The experts said a body of paying ore ought to be found in that direction. The winze in Occidental going down from the 750-foot level is looking well, with the bottom in fair-grade ore. The joint Chollar and Potosi west crossdrift is in over 210 feet. Sinking has been resumed in shaft No. 1. It is down on an incline about 1050 feet. In Chollar they are crossdrifting west on the 200-foot and 500-foot levels. No change is reported in the joint work being done by Con. Virginia, Best & Belcher and Gould & Curry.

The following illustrates the changes for the week:

Mines.	Feb. 3.	Feb. 10.
Alpha		
Alta Consolidated	$ 16	
Andes		
Belcher		$ 27
Best & Belcher	44	40
Bodie		
Bullion	10	
Challenge		
Chollar	20	40
Confidence		
Consolidated California and Virginia	90	88
Consolidated New York		
Crown Point		
Exchequer		
Gould & Curry	31	
Hale & Norcross	1 65	1 55
Justice		
Mexican	32	33
Ophir	52	50
Overman	06	
Potosi	26	23
Savage	14	28
Sierra Nevada	1 00	95
Union	43	39
Utah		10
Yellow Jacket		

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 10, 1897.

9:30 A. M. SESSION.

100 Belcher	27	250 Occidental	1 55
100 Best & Belcher	40	200 Potosi	23
200 Chollar	40	400 Sierra Nevada	95
300 Con Cal & Va	88	100 Union	38
100 Mexican	33	100 Utah	10

SECOND SESSION—2:30 P. M.

200 Ophir	50	8000 Con Imperial	01
300 Con Cal & Va	88	700 Sierra Nevada	95
300 Savage	28	100 Utah	10
100 Chollar	38	100 Union	39
700 Potosi	21	300 Silver Hill	03
300 H. & N	1 55	200 N G & C	15

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage.

Money loaned mines.

Mining companies organized, their property experted, financed and managed.

Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated

Examine mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

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Rainfall and Temperature.

The following data for the week ending 5 A. M., February 9, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Minimum Temperature for the Week.	Maximum Temperature for the Week.
Eureka	2.14	21 06	31 92	26.76	38	70
Red Bluff	2 00	9.22	18 85	16 28	36	64
Sacramento	1 22	6 84	13 32	12.44	40	62
San Francisco	46	5 85	16 70	14 84	45	62
Fresno	.92	3.23	8 08	6 04	36	74
San Luis Obispo	.92	3 88	15 25	....	38	76
Los Angeles	.34	4.11	11.42	10.17	42	78
San Diego	.06	3.38	7.06	6 08	42	68
Yuma		1 26	4 81	2 34	42	78

Assessment Notices.

THE ORLEANS MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Grass Valley Mining District, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1898, an assessment (No. 7, new series) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary at the office of the company, No. 575 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. O. THURSTON, Secretary.

Office—No. 575 Mission street, San Francisco, California.

FALL RIVER CONSOLIDATED GOLD QUARTZ Company.—Location of principal place of business, San Francisco, California; location of works, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 15th day of January, 1898, an assessment (No. 11) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 313-315 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on THURSDAY, the 21st day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. LORSBACH, Secretary.

Office—313-315 Front street, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

BALIOL GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1898, an assessment (No. 2) of 30 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of March, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made [illegible] will be sold on MONDAY, the 28th day [illegible] 1898, to pay the delinquent assess[illegible] with the costs of advertising and e[illegible]

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Mills building, room 7, fifth floor, San Francisco, California.

DIVIDEND NOTICE.

JAMISON MINING COMPANY, Rooms 50 and 54, 120 Sutter St., San Francisco Cal., January 25th, 1898.

DIVIDEND NUMBER ONE.—At their meeting of January 25th, 1898, it was resolved by the Board of Directors of the Jamison Mining Company to pay to the Stockholders of the Company from the surplus funds in the treasury, a dividend of Nineteen Thousand Five Hundred Dollars ($19,500), being Five Cents (5 cts.) per share on the capital stock of the Company. The dividend will be payable at the office of the Company on the Fifteenth (15th) day of February, 1898, to all stockholders of record on the Fifth (5th) day of February, 1898. Transfer books will be closed at the close of business on the 5th of February, and reopened on the morning of February 16, 1898. SAM. W. CHEYNEY, Secretary.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from William N. Lamb, in the Croff Mine, near Oleta, Amador Co., to deposit tailings behind the dam of the Cumbridge Mine, in Dry Creek; from B. F. Steese and O. Wochler, in the Long Ravine Mine, near Spenceville, Nevada Co., to deposit tailings in Long Ravine; and from J. W. Cummins, in the Amo Mine, near Oroville, Butte Co., to deposit tailings in Cherokee Ravine, gives notice that a meeting will be held at Room 50, Flood Building, San Francisco, Cal., on February 28, 1898, at 2:30 P. M.

LIGHTNING WELL MACH'Y
PUMPS, AIR LIFTS,
GASOLINE ENGINES
THE AMERICAN WELL WORKS.
AURORA ILL.-CHICAGO.-DALLAS, TEX.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Humboldt County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 20th day of November, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Harvey M. Binckley	2	1	5 00
Alice E. Binckley	20	4	20 00
Alice E. Binckley	23	20	100 00
Alice E. Binckley	24	20	100 00
Alice E. Binckley	25	20	100 00
Alice E. Binckley	26	20	100 00
Alice E. Binckley	39	1	5 00
Alice E. Binckley	40	2	10 00
Caroline S. Townsend	18	20	100 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the corporation, 125 Beale street, San Francisco, California, on SATURDAY, the 29th day of January, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the day of sale of the above delinquent stock has been postponed to SATURDAY, February 26th, 1898, at the same hour and place. H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice. There are delinquent upon the following described stock, on account of assessment (No. 12) levied on the 3rd day of January, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
L. P. Drexler	87	10	90
Leo Alexander, Trustee	85	17,990	1,619 10

And in accordance with law, and an order from the Board of Directors, made on the 3rd day of January, 1898 so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 28th day of February, 1898, at the hour of 2 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale. CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

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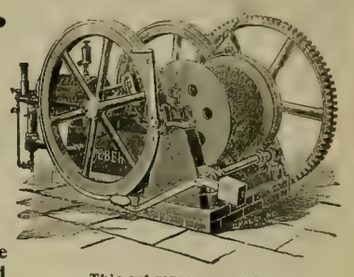


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SAN PEDRO, N. M., April 23, 1897.

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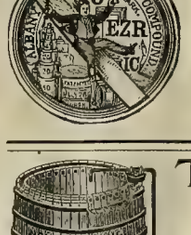
GENTLEMEN—Yours of the 14th at hand. The 10 H. P. "Weber" Gasoline Engine Hoist we got is "out of sight," and the longer we run it, the better we like it. We are now down with our shaft in the neighborhood of 175 feet. We only work one shift. All it costs us for gasoline is 32 cents per day. It takes us from three to four hours a day to do our hoisting. Yours truly, J. T. McLAUGHLIN.

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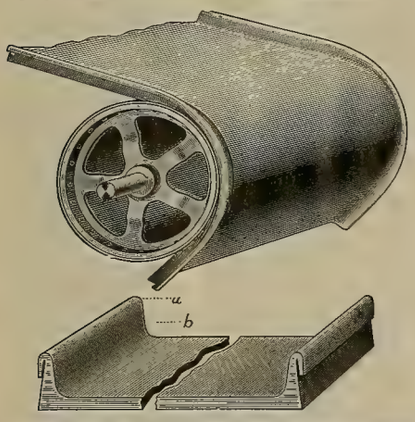


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ORIGINAL EMPIRE MILL & MINING COMPANY,
GRASS VALLEY, NEVADA CO., CAL., Feb. 20, 1897.

JAS. S. BROWNELL, FSQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

ROANOKE MINING COMPANY,
MOKELUMNE HILL, March 4, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: We have in our 20-stamp mill at this place five Frue vanners; three of these are equipped with the Patent Lip flange belt and two with the plain flange belt. We certainly consider the former a great improvement on the latter. They will certainly wear much longer, as cracking now seems out of the question. Any one purchasing the Frue vanning machine should see that it is equipped with the Patent Lip flange belt. Very truly yours, ROANOKE MINING COMPANY. Per G. M. WILDE, Acting Superintendent.

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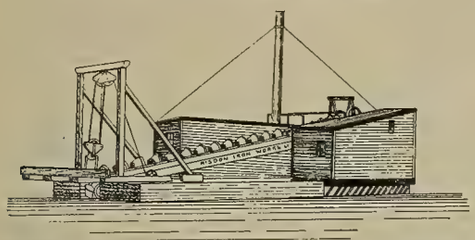
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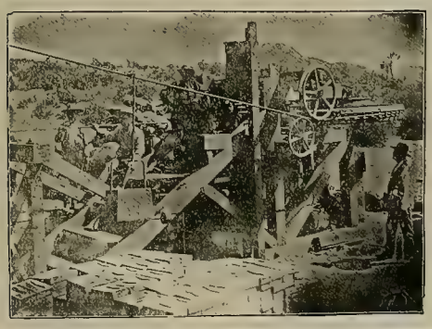
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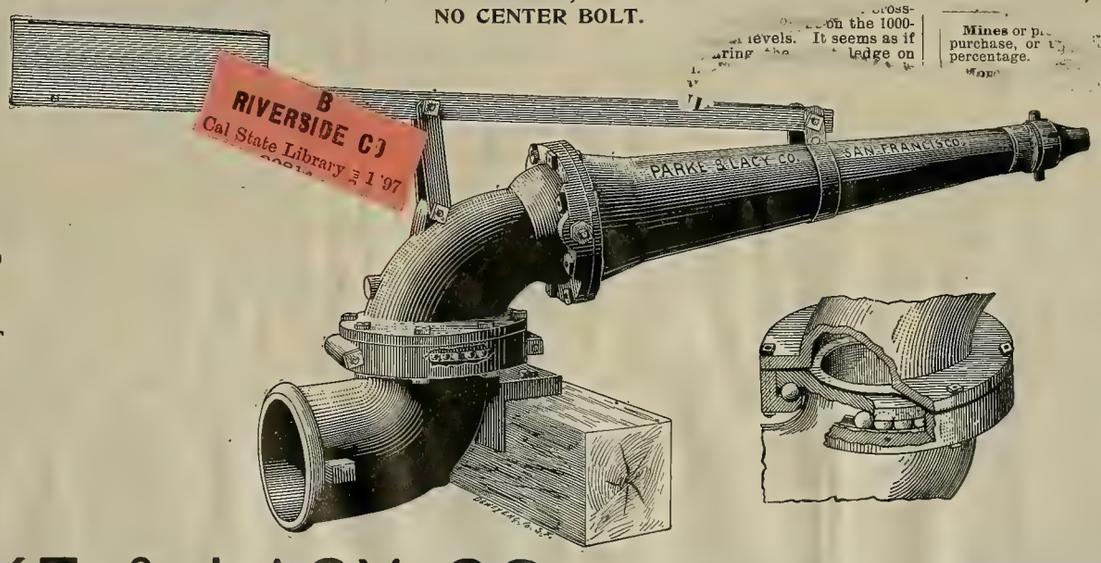
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No. 1963.—VOLUME LXXVI. Number 8. SAN FRANCISCO, SATURDAY, FEBRUARY 19, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Newest El Dorado.

The present Klondike excitement will result in putting Alaska and that entire northern region a century in advance of what it would have been in point of development had the Klondike craze not come. Organized government, increased population, facilities of travel, better postal service, knowledge of the country will be among the good results of the present stampede.

For twenty years the columns of this paper contained about all that was to be learned of the mineral wealth of that region, and much that was printed herein is now being circulated all over the world as authentic and reliable data regarding that region. On this page is reproduced from the enterprising *Mining Record* of Juneau some scenes that tell their own story.



120-STAMP MILL OF THE ALASKA-MEXICAN GOLD MINING CO.



AT CIRCLE CITY—ARRIVING FROM THE DIGGINGS.



MINERS AT SHEEP CAMP, BOUND FOR THE KLONDIKE.

Some of the world's energy and treasure is now being devoted to the exploitation of this rich northern storehouse, and the latest and most successful appliances in gold mining are to be applied in the work. In this regard it is interesting to note that the largest stamp mill in the world is shortly to be erected on one of Alaska's gold quartz mines — the Alaska-Treadwell, on Douglas island, illustrating the extent and value of Alaska's quartz milling; and if one-half that is claimed turns out true, the placer yield of the Yukon region will rival in richness the early days of gold product in California.



YUKONERS IN COSTUME AT FORTY MILE.



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MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....General Manager

San Francisco, February 19, 1898.

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RIVER IMPROVEMENT, so far as California is concerned, has received a black eye in Congress this session. No appropriation will be made, and, under the circumstances, none could be reasonably expected. There is at present available in the State and national appropriations $800,000, less the salaries of the State officials, who seem to have solely learned how to avoid doing what they were officially created to do.

THE Committee on Public Lands of the House of Representatives has reported favorably on the California mineral lands bill. The report includes letters from Commissioner Hermann and Secretary Bliss, setting forth the amount of land to be classified and the cost which has attended the examination of the lands in Idaho and Montana under similar acts. A strong effort to pass the bill will be made. The committee reports that there are 13,487,602 acres in California subject to such reclassification.

THE advertisements of transportation to Coolgardie and South Africa are seen no more. The Alaska transportation companies on land and sea are doing an enormous present business. The rush northward continues, and apparently has not yet reached its limit. All sorts of old tubs are in use, and occasionally a fearful disaster is reported. Those who are determined to go should at least see that a stout vessel, properly manned, carries them. There are several such craft on the northern route.

A CUBE OF CRYSTAL ICE and a branch covered with large ripe oranges are shown in the Nevada Co. exhibit at the Mining Fair. A modest little placard says "this ice was cut and these oranges were plucked in Nevada county the same day," illustrating the diversity of California climate. There are fifty-seven counties in California, some having an area of over 20,000 square miles. Nevada is comparatively a small county—958 square miles—but, besides ice and oranges, has contributed over $218,000,000 in gold. And there are fifty-six others.

AGENTS securing new subscriptions to this paper are now traversing this west half of America. So far as known, this system is not generally practiced by technical journals; but no matter how large our subscription lists, it is always desirable to have them still larger. The advertiser has very little use for a paper that does not constantly keep up a large subscription list, and a subscriber has as little use for a paper that ceases to be interesting or valuable. It is with pleasure the fact is stated that the number who weekly read this paper is just double what it was four years ago. In this regard it is also in order to say that no one anywhere is authorized to solicit subscriptions for this paper without due authorization and the possession of regularly signed and numbered blank receipts from the business office.

An Unwelcome Ruling.

Since the publication in these columns on the 5th inst. of the latest ruling of the Interior Department and the General Land Office, regarding the important question of how much work must be put on a group of mining claims before patent will be issued, it is evident that nothing in recent years has so stirred the general mining public. Numerous letters have been received by this paper, nearly all expressing the belief that the interests of miners can best be conserved by a general protest against such ruling, and asking for at least a suspension of the ruling for a certain time, to obviate probable trouble and expense to the miners everywhere. This vexatious condition of affairs affects especially those whose applications are pending, and those about to apply for patents under the old ruling. In this connection it is to be noted that the communications from Los Angeles and other southern California subscribers regarding the wording of the editorial of the 5th inst. deserve consideration. To obviate any possible misunderstanding it is here restated, that, whereas, the former ruling governing the amount of work necessary in procuring patents on groups of mining claims was virtually that applicants for U. S. patents could secure patent on a group containing any number of claims upon proper affidavits that $500 worth of labor had been done on a tunnel, shaft, incline or other work where that work was intended to and actually did go to the development of the entire group, this has been changed by paragraph 53 of the new ruling, approved December 15th, 1897 (which was published in full in the issue of the 5th inst.), and which in effect is: That if more than one claim is included in the application for patent, that an amount equal to $500 for each claim in the group for which patent is asked must be shown to have been expended by the applicant or his grantors; so that if one or more owners should apply for patent for a group containing five claims, the affidavits must show that he or they have done $2500 worth of work on one or more claims in the group; or if ten claims, $5000 worth of work.

In addition to these onerous obligations it is to be noted that acting under the former ruling—which was supposed to be of a permanent nature—a great many throughout this entire region made purchases of original locations, and did what under the then ruling was the necessary amount of work on groups of claims; and after having had the required land office surveys made up to the first of the year, made application and paid at the rate of $5 an acre for the claims so applied for. All this expense has been incurred, and now from the wording of the regulation it would seem as though any of those transactions prior to January 1st, 1898, are subject to cancellation.

So far as this paper has been able to obtain information, no one in authority can say just to what extent this new ruling will be retroactive. At this writing, so far as California is concerned, the present Surveyor-General of the State has been displaced by a new appointment from Washington—Mr. Gleaves of Shasta county—and it is impossible to obtain any ruling thereon. Applications for patent under the old ruling are also being advertised in papers throughout the mining regions; and in general this ruling throws everything in connection with it into a state of confusion. Under the circumstances it is believed that the best interests of the miners (in whose interests all this legislation is supposed to be) require that there shall be a suspension of the ruling in question until, say, the first of July, 1898.

There is no desire to comment on the matter, simply make a statement of existing facts. The old ruling was abused in some instances. The new ruling should not have gone into effect with so little time for those whom it affected to guard their interests. The whole thing illustrates forcibly what has so often been stated herein—the absolute need of a Department of Mines and Mining. If it cost a million dollars a year it would be economical in comparison with the present apparently unavoidable system of executive connection with the nation's greatest basic industry.

Deep Mining in Nevada and California.

The article on the deep levels of the Comstock, Nevada, lode, which appeared in the issue of the 5th inst., has been so extensively copied and endorsed as to indicate a general recognition of its truth. In general, the fact that values continue at great depth is daily receiving fresh and additional proof in California, where deep mining pays. The Idaho, Nevada county, 2200 feet deep, the Kennedy, Amador county, 2300 feet deep, the Eureka, Argonaut, Keystone, Gwin and other well-known California mines may be cited. The Eureka, at Sutter Creek, Amador county, paid millions in dividends, worked to the 2200-foot level, and, it is believed, would pay additional millions if pushed 1000 feet deeper. The biggest body of ore ever found in the Kennedy mine, in the same county, was recently developed at a vertical depth of 2200 feet. The Keystone, also in Amador county, was abandoned at the 1300-foot level after paying several millions in dividends. When new owners with different ideas took hold, they sunk deeper and soon had forty stamps dropping on pay ore. The Gwin mine, Calaveras county, is another good example. It also paid many millions in dividends, but at a depth of 1200 feet was abandoned and lay idle for eighteen years. Some California miners who were not afraid to spend money, and who were thoroughly imbued with the belief which this paper has constantly maintained—viz., that deep mining will pay—took hold, spent $150,000, sunk deeper. The result is profit and proof of permanency of the lode at greater depth. The Gwin has what is as large a pay chute as any in the State—over 1300 feet in length. A 40-stamp mill is coining money for its enterprising owners. These are not few or isolated cases. They are illustrative of the fact that deep mining is profitable in California. That deeper mining would be as profitable on the Comstock is almost as self-evident a proposition.

This whole question of deep mining in Nevada and California is worthy of notice in regard to the speculative aspect of the matter. In this State one of the most influential reasons why there had not, up to recently, been more deep mining is that there was never what may be styled public money—that is, money derived from the sale of shares of mining stock. In California most of the quartz and hydraulic mining has been all along done by private individuals or by close corporations who did not care to take the risk of bold ventures involving the expenditure of millions. Usually the mine paid as it went. If it did not pay, it did not go; but there was little laid by as profit or a contingent of working capital, and so when the ore appeared to give out, or the cost of sinking grew too great, or the placer ground ceased to yield very well, operations were discontinued. It was different on the Comstock, where the biggest and boldest mining exploitation in the world was done at an enormous expense, by reason of the fact that the Comstock shares were on the market, were bought and sold, and there was any amount of money. To the purchasers or sellers of these shares in this city or elsewhere it made very little difference what day's wages were paid, or what powder or timbering or machinery cost, most of the buyers holding the stock only over night, and knowing little and caring less as to the future of the mine whose stock they held in fleeting transit. As a matter of fact, it must be said that the value of stock gambling was great to deep mining on the Comstock, inasmuch as it afforded abundant means to carry on the work. While we would not be understood as indorsing or recommending that style of procedure, the idea is worthy of note in connection with consideration of the article on deep mining in the issue of the 5th inst.

ADVICE is asked by several with incipient Klondicitis as to where best to go. The true Alaskamaniac does not want advice; he is already going; he simply wants reinforcement of his opinion. The advice of the MINING AND SCIENTIFIC PRESS is, don't go. However, there are adventurous spirits who deserve to succeed. To those may be pointed out the folly of going to the Klondike, as everything worth taking is taken up, and everything worth holding is held at an enormous figure. There are better chances in such districts as the Copper river, where

ground is still unlocated and may be taken up. The folly of going where everything is already secured, and where even the promise of high wages is discounted by the inevitable reduction in wages in the competition of numbers, is manifest to any one not hypnotized by the wild stories mostly put in circulation for profit.

Prizes for the Winners.

Next Tuesday, the 22nd inst., will be Miners' Day at the Mining Fair. The MINING AND SCIENTIFIC PRESS will give a massive gold championship medal to the prize winner in the drilling contest. Mayor Phelan will also give a gold medal to the champion in the wrestling contest. These are in addition to the prizes mentioned in the following, which are the rules governing the drilling contests on that day:

Double-Handed Championship Contest.—Entrance fee, $10; at least ten teams to enter; down hole. First prize, championship and a purse of $250 in cash and all entrance fees, making a cash prize of at least $350 to go to the winners; second prize, $150 in cash; third prize, purse of $75 in cash; fourth prize, purse of $37.50. All steel must be full size, seven-eighths of an inch. No swedged bits allowed. The smallest bit must measure seven-eighths of an inch. "Milling" hole with two hammers not allowed beyond two blows from each hammer when change is made. Weight of hammer not to exceed eight pounds. Rock to be used, Rocklin granite. Time of contest, fifteen minutes.

Single-Handed Championship Contest.—Entrance fee, $5; ten to enter; down hole. First prize, championship of California, purse of $125 in cash and all entrance fees, making a cash prize of at least $175 to go to the winner; second prize, purse of $75 in cash; third prize, purse of $37.50 in cash; fourth prize, purse of $18.75 in cash. All steel must be full size, three-fourths of an inch. No swedged bits allowed. The smallest bit must measure three-quarters of an inch. Weight of hammer not to exceed four and one-half pounds. Rock to be used, Rocklin granite. Time of contest, fifteen minutes.

Considerable interest has always been taken in these hand drilling contests. The most recent of any note was at Helena, Mont., June 13th, '97, when Davy and Freethy of Butte won first money, drilling 41 5/16 inches in fifteen minutes. The same team made a record of 39 inches in Spokane, Wash., last year. W. Bieber of Lump Gulch, Mont., single-handed, drilled 15⅝ inches in ten minutes.

United States Mining Laws, and Regulations Thereunder, Relative to the Reservation, Exploration, Location, Possession, Purchase and Patenting of the Mineral Lands in the Public Domain.

So many requests are received from all over the west half of America regarding U. S. mining laws that, as a matter of general information, and as the easiest way of answering such inquiries, the latest official compilation of Federal Mining Law is herewith published. It is officially approved by Secretary of the Interior Bliss and Commissioner of the General Land Office Hermann under date of Dec. 15th, '97. Like a good many other things in these columns, this matter is worth preserving for authentic reference on questions that constantly arise:

MINERAL LANDS OPEN TO EXPLORATION, OCCUPATION AND PURCHASE.

SEC. 2318, R. S. In all cases lands valuable for minerals shall be reserved from sale, except as otherwise expressly directed by law.

SEC. 2319. All valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and purchase, and the lands in which they are found to occupation and purchase, by citizens of the United States and those who have declared their intention to become such, under regulations prescribed by law, and according to the local customs or rules of miners in the several mining districts, so far as the same are applicable and not inconsistent with the laws of the United States.

NATURE AND EXTENT OF MINING CLAIMS.

1. Mining claims are of two distinct classes—lode claims and placers.

LODE CLAIMS.

SEC. 2320. R. S. Mining claims upon veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper or other valuable deposits, heretofore located, shall be governed as to length along the vein or lode by the customs, regulations and laws in force at the date of their location. A mining claim located after the tenth day of May, eighteen hundred and seventy-two, whether located by one or more persons, may equal, but shall not exceed, one thousand five hundred feet in length along the vein or lode; but no location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located. No claim shall extend more than three hundred feet on each side of the middle of the vein at the surface, nor shall any claim be limited by any mining regulation to less than twenty-five feet on each side of the middle of the vein at the surface, except where adverse rights existing on the tenth day of May, eighteen hundred and seventy-two, render such limitation necessary. The end lines of each claim shall be parallel to each other.

SEC. 2322. The locators of all mining locations heretofore made, or which shall hereafter be made, on any mineral vein, lode or ledge situated on the public domain, their heirs and assigns, where no adverse claim exists on the tenth day of May, eighteen hundred and seventy-two, so long as they comply with the laws of the United States and with State, Territorial and local regulations not in conflict with the laws of the United States governing their possessory title, shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations, and of all veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically, although such veins, lodes or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side lines of such surface locations. But their right of possession to such outside parts of such veins or ledges shall be confined to such portions thereof as the between vertical planes drawn downward as above described, through the end lines of their locations, so continued in their own direction that such planes will intersect such exterior parts of such veins or ledges. And nothing in this section shall authorize the owner or possessor of a vein or lode which extends in its downward course beyond the vertical lines of his claim to enter upon the surface of a claim owned or possessed by another.

SEC. 2336. Where two or more veins intersect or cross each other, priority of title shall govern, and such prior location shall be entitled to all ore or mineral contained within the space of intersection; but the subsequent location shall have the right of way through the space of intersection for the purposes of the convenient working of the mine. And where two or more veins unite, the oldest or prior location shall take the vein below the point of union, including all the space of intersection.

CLAIMS LOCATED OR PATENTED PRIOR TO MAY 10, 1872.

2. The status of lode claims located or patented previous to the 10th day of May, 1872, is not changed with regard to their extent along the lode or width of surface; but the claim is enlarged by sections 2322 and 2328, by investing the locator, his heirs or assigns, with the right to follow, upon the conditions stated therein, all veins, lodes or ledges, the top or apex of which lies inside of the surface lines of his claim.

3. It is to be distinctly understood, however, that the law limits the possessory right to veins, lodes or ledges, *other* than the one named in the original location, to such as were not *adversely claimed on May 10, 1872*, and that where such other vein or ledge was so adversely claimed at that date the right of the party so adversely claiming is in no way impaired by the provisions of the Revised Statutes.

CLAIMS LOCATED SUBSEQUENTLY TO MAY 10, 1872.

4. From and after the 10th day of May, 1872, any person who is a citizen of the United States, or who has declared his intention to become a citizen, may locate, record and hold a mining claim of *fifteen hundred linear feet* along the course of any mineral vein or lode subject to location; or an association of persons, severally qualified as above, may make joint location of such claim of *fifteen hundred feet*, but in no event can a location of a vein or lode made subsequent to May 10, 1872, exceed fifteen hundred feet along the course thereof, whatever may be the number of persons composing the association.

5. With regard to the extent of surface ground adjoining a vein or lode, and claimed for the convenient working thereof, the Revised Statutes provide that the lateral extent of locations of veins or lodes made after May 10, 1872, shall in no case *exceed three hundred feet on each side of the middle of the vein at the surface*, and that no such surface rights shall be limited by any mining regulations to less than twenty-five feet on each side of the middle of the vein at the surface, except where adverse rights existing on the 10th of May, 1872, may render such limitation necessary, the end lines of such claims to be in all cases parallel to each other. Said lateral measurements cannot extend beyond three hundred feet on *either* side of the middle of the vein at the surface, or such distance as is allowed by local laws. For example: 400 feet cannot be taken on one side and 200 feet on the other. If, however, 300 feet on each side are allowed, and by reason of prior claims but 100 feet can be taken on one side, the locator will not be restricted to less than 300 feet on the other side; and when the locator does not determine by exploration *where* the middle of the vein at the surface is, his discovery shaft must be assumed to mark such point.

6. By the foregoing it will be perceived that no lode claim located after the 10th of May, 1872, can exceed a parallelogram fifteen hundred feet in length by six hundred feet in width, but whether surface ground of that width can be taken depends upon the local regulations or State or Territorial laws in force in the several mining districts; and that no such local regulations or State or Territorial laws shall limit a vein or lode claim to less than fifteen hundred feet along the course thereof, whether the location is made by one or more persons, nor can surface rights be limited to less than fifty feet in width unless adverse claims existing on the 10th day of May, 1872, render such lateral limitation necessary.

7. The rights granted to locators under section 2322, Revised Statutes, are restricted to such locations on veins, lodes or ledges as may be "situated on the *public domain*." In applications for lode claims where the survey conflicts with the survey or location lines of a prior valid lode claim, and the ground within the conflicting surveys is excluded, the applicant not only has no right to the excluded ground, but he has no right to that portion of any vein or lode the top or apex of which lies within such excluded ground, unless his location was prior to May 10, 1872. His right to the lode claimed terminates where the lode, in its onward course or strike, intersects the exterior boundary of such excluded ground and passes within it. The end line of his survey should not, therefore, be established beyond such intersection.

8. Where, however, the lode claim for which survey is being made was located prior to the conflicting claim, and such conflict is to be excluded, in order to include all ground not so excluded, the end line of the survey may be established within the conflicting lode claim, but the line must be so run as not to extend any farther into such conflicting claim than may be necessary to make such end line parallel to the other end line and at the same time embrace the ground so held and claimed. The useless practice in such cases of extending *both* the side lines of a survey into the conflicting claim, and establishing an end line wholly within it beyond a point necessary under the rule just stated, will be discontinued.

DESCRIPTION OF CLAIM AND ACTS NECESSARY IN ORDER TO HOLD THE SAME—LOCAL RULES AND REGULATIONS.

SEC. 2324, R. S. The miners of each mining district may make regulations not in conflict with the laws of the United States, or with the laws of the State or Territory in which the district is situated, governing the location, manner of recording, amount of work necessary to hold possession of a mining claim, subject to the following requirements: The location must be distinctly marked on the ground so that its boundaries can be readily traced. All records of mining claims hereafter made shall contain the name or names of the locators, the date of the location and such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim. On each claim located after the tenth day of May, eighteen hundred and seventy-two, and until a patent has been issued therefor, not less than one hundred dollars' worth of labor shall be performed or improvements made during each year. On all claims located prior to the tenth day of May, eighteen hundred and seventy-two, ten dollars' worth of labor shall be performed or improvements made by the tenth day of June, eighteen hundred and seventy-four, and each year thereafter, for each one hundred feet in length along the vein until a patent has been issued therefor: but where such claims are held in common, such expenditure may be made upon any one claim, and upon a failure to comply with these conditions, the claim or mine upon which such failure occurred shall be open to relocation in the same manner as if no location of the same had ever been made, provided that the original locators their heirs, assigns or legal representatives have not resumed work upon the claim after failure and before such location. Upon the failure of any one of several co-owners to contribute his proportion of the expenditures required hereby, the co-owners who have performed the labor or made the improvements may, at the expiration of the year, give such delinquent co-owner personal notice in writing or notice by publication in the newspaper published nearest the claim, for at least once a week for ninety days, and if, at the expiration of ninety days after such notice in writing or by publication such delinquent should fail or refuse to contribute his proportion of the expenditure required by this section, his interest in the claim shall become the property of his co-owners who have made the required expenditures.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provisions of the fifth section of the act entitled "An act to promote the development of the mining resources of the United States," passed May 10th, eighteen hundred and seventy-two, which requires expenditures of labor and improvements on claims located prior to the passage of said act, are hereby so amended that the time for the first annual expenditure on claims located prior to the passage of said act shall be extended to the first day of January, eighteen hundred and seventy-five.

That section twenty-three hundred and twenty-four of the Revised Statutes of the United States be amended by adding the following words: "*Provided*, That the period within which the work required to be done annually on all unpatented mineral claims shall commence on the first day of January succeeding the date of location of such claim, and this section shall apply to all claims located since the tenth day of May, anno Domini eighteen hundred and seventy-two."

SEC. 2327, R. S. The description of vein or lode claims, upon surveyed lands, shall designate the location of the claim with reference to the lines of the public surveys, but need not conform therewith; but where a patent shall be issued for claims upon unsurveyed lands, the surveyor-general, in extending the surveys, shall adjust the same to the boundaries of such patented claim, according to the plat or description thereof, but so as in no case to interfere with or change the location of any such patented claim.

9. Locators cannot exercise too much care in defining their locations at the outset, inasmuch as the law requires that all records of mining locations made subsequent to May 10, 1872, shall contain the name or names of the locators, the date of the location, and such a *description of the claim or claims located*, by reference to some natural object or permanent monument, as will identify the claim.

10. No lode claim shall be located until after the discovery of a vein or lode within the limits of the claim, the object of which provision is evidently to prevent the appropriation of presumed mineral ground for speculative purposes to the exclusion of *bona fide* prospectors, before sufficient work has been done to determine whether a vein or lode really exists.

11. The claimant should, therefore, prior to locating his claim, unless the vein can be traced upon the surface, sink a shaft, or run a tunnel or drift, to a sufficient depth therein to discover and develop a mineral-bearing vein, lode, or crevice; should determine, if possible, the general course of such vein in either direction from the point of discovery, by which direction he will be governed in marking the boundaries of his claim on the surface. His location notice should give the course and distance as nearly as practicable from the discovery shaft on the claim to some permanent, well-known points or objects, such, for instance, as stone monuments, blazed trees, confluence of streams, point of intersection of well-known gulches, ravines, or roads, prominent buttes, hills, etc., which may be in the immediate vicinity, and which will serve to perpetuate and fix the *locus* of the claim and render it susceptible of identification from the description thereof given in the record of locations in the district, and should be duly recorded.

12. In addition to the foregoing data, the claimant should state the names of adjoining claims, or, if none adjoin, the relative positions of the nearest claims; should drive a post or erect a monument of stones at each corner of his surface ground, and at the point of discovery or discovery shaft should fix a post, stake, or board, upon which should be designated the name of the lode, the name or names of the locators, the number of feet claimed, and in which direction from the point of discovery; it being essential that the location notice filed for record, in addition to the foregoing description, should state whether the entire claim of fifteen hundred feet is taken on one side of the point of discovery, or whether it is partly upon one partly upon the other side thereof, and in the latter case, how many feet are claimed upon each side of such discovery point.

13. The location notice must be filed for record in all respects as required by the State or Territorial laws and local rules and regulations, if there be any.

14. In order to hold the possessory title to a mining claim located prior to May 10, 1872, and for which a patent has not been issued, the law requires that *ten dollars* shall be expended annually in labor or improvements on each claim of *one hundred feet* on the course of the vein or lode until a patent shall have been issued therefor; but where a number of such claims are held in common upon the same vein or lode, the aggregate expenditure that would be necessary to hold all the claims, at the rate of ten dollars per hundred feet, may be made upon any one claim. The first annual expenditure upon claims of this class should have been performed subsequent to May 10, 1872, and prior to January 1, 1875. From and after January 1, 1875, the required amount must be expended *annually* until patent issues.

15. In order to hold the possessory right to a location made since May 10, 1872, not less than one hundred dollars' worth of labor must be performed or improvements made thereon annually until entry shall have been made. Under the provisions of the act of Congress approved January 22, 1880, the first annual expenditure becomes due and must be performed during the calendar year succeeding that in which the location was made. Expenditure made or labor performed prior to the first day of January succeeding the date of location will not be considered as a part of or applied upon the first annual expenditure required by law.

16. Failure to make the expenditure or perform the labor required upon a location made before or since May 10, 1872, will subject a claim to relocation, unless the original locator, his heirs, assigns, or legal representatives have resumed work after such failure and before relocation.

17. Annual expenditure is not required subsequent to entry, the date of issuing the patent certificate being the date contemplated by statute.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provisions of section numbered twenty-three hundred and twenty-four of the Revised Statutes of the United States, which require that on each claim located after the tenth day of May, eighteen hundred and seventy-two, and until patent has been issued therefor, not less than one hundred dollars' worth of labor shall be performed or improvements made during each year, be suspended for the year eighteen hundred and ninety-four, so that no mining claim which has been regularly located and recorded as required by the local laws and mining regulations shall be subject to forfeiture for non-performance of the annual assessment for the year eighteen hundred and ninety-four; *Provided*, That the claimant or claimants of any mining location, in order to secure the benefits of this act, shall cause to be recorded in the office where the location notice or certificate is filed, on or before December thirty-first, eighteen hundred and ninety-four, a notice that he or they in good faith intend to hold and work said claim: *Provided, however*, That the provisions of this act shall not apply to the State of South Dakota.

SEC. 2. That this act shall take effect from and after its passage.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section two thousand three hundred and twenty-four of the Revised Statutes be, and the same is hereby, amended so that where a person or company has or may run a tunnel for the purpose of developing a lode or lodes, owned by said person or company, the money so expended in said tunnel shall be taken and considered as expended on said lode or lodes, whether located prior to or since the passage of said act; and such person or company shall not be required to perform work on the surface of said lode or lodes in order to hold the same as required by said act.

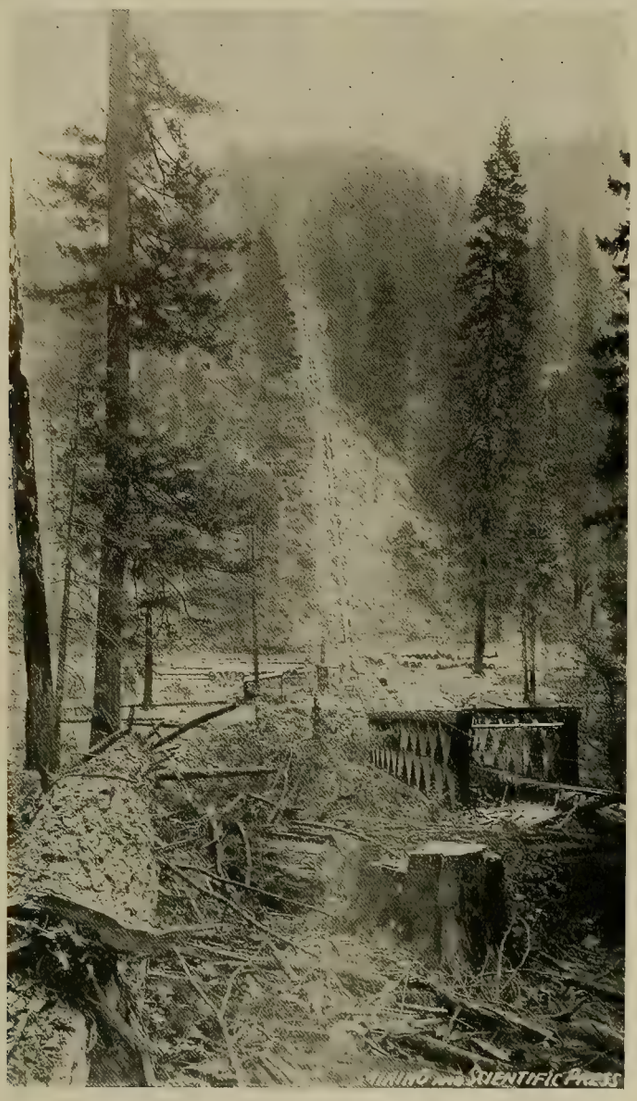
(To be Continued.)

A Trinity County, California, Hydraulic Enterprise.

In the issue of November 27th, '97, was illustrated and described the large hydraulic enterprise of the Cie Fse des Placers Hydrauliques de Junction City, Trinity county, California, the data being mostly furnished by Mr. E. Saladin, the manager of the French company, in which considerable interest was taken, the magnitude of the enterprise eliciting comment, the size and length of the pipe being particularly noticed.

In Trinity county, as in other parts of this State, are being exhibited good examples of what may be styled the "progressive element of hydraulic mining." It is within the remembrance of many California miners when what is now being daily done in hydraulic mining in this State was considered an impossibility. Many old miners will recall when such problems as those on the Feather river were considered difficult, and what is now being done looked upon as an impossibility. We have a good deal to say about the progress in quartz mining, and justly, but it is to be noticed that hydraulic mining in this State progresses as well. This calls up remembrance of such a man as H. B. Lathrop, who many years ago was foreman for a hydraulic company on Feather river; and one day, overhearing the engineer of the company explaining to the president, who was visiting the works, that something was an "impossibility," asked the engineer: "What is it that is impossible?" The engineer explained that the desire was to bring water for the claim through a pipe which ought to be 20 inches in diameter, upon which would be a pressure of 400 vertical feet. Lathrop picked up a pitcher of water standing on the table, poured out a glassful, and said: "Was there any trouble about that?" "No," was the reply. "Well," said Lathrop, "just make that glass 400 feet high, and you can still fill it just the same, if the glass is strong enough." "That's just it," said the engineer; "you can't make a pipe of that size, nor make it strong enough." "But I can, and will," said Lathrop. He took a pencil and began figuring what the pressure would be, and finally decided that an 18-inch pipe would do. "But," the engineer said, "an 18-inch pipe is out of the question." Finally the president told Lathrop to go ahead and get his 18-inch pipe. In those days he had some little difficulty; but he had the pipe built and put in just as he wanted it, and it worked all right. Neither Lathrop nor anyone connected with the work those days thought that the time would come when up in Trinity county would be built, as the French company has done, an eleven-mile ditch and 5700 feet of pipe put in, of which 2200 feet is 30-inch pipe and 3400 feet is 36-inch pipe.

The purport, however, of this present article is to illustrate another large hydraulic enterprise in Trinity county, namely, that of the La Grange Hydraulic Gold Mining Company, of which Mr. Wm. H. Radford of Weaverville is the superintendent. Through the courtesy of Mr. Radford the MINING AND SCIENTIFIC PRESS has received profiles, sketches



STUART'S FORK PIPE LINE, LOOKING NORTH.



STUART'S FORK PIPE LINE, LOOKING SOUTH.

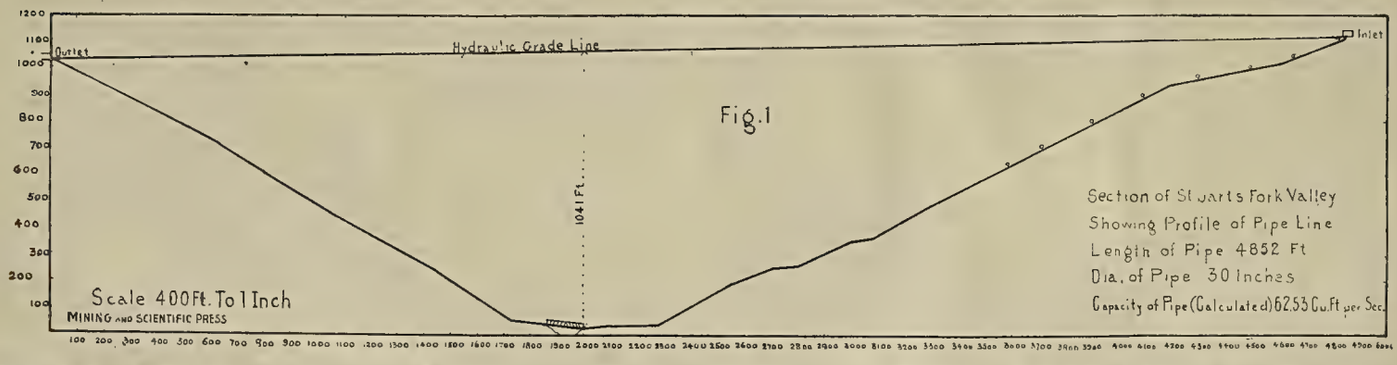
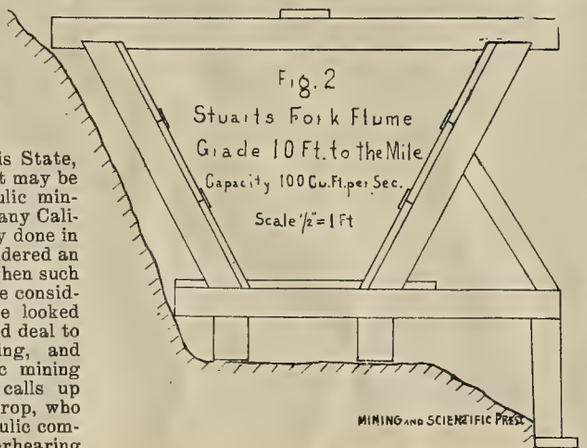


Fig. 1



and figures, from which the accompanying are engraved; and he has also supplied some data of interest to hydraulic miners everywhere.

Fig. 1 on this page shows a profile of the inverted syphon lately put in by the La Grange Hydraulic Gold Mining Company, forming a part of its main water system, which, when completed, will convey the water of Stuart's Fork and Rush creek to its mines on Oregon Gulch mountain and Morris hill in Trinity county. The pipe is 30 inches in diameter, is made of the best steel and was tarred and tested before being put in place. It is well anchored at all the angles and is buried for a greater part of its length in a trench which averages about 3 feet in depth and 3 feet in width. There are eight 3-inch air valves on the inlet side and five manholes at points about 1000 feet apart. The air valves are of the ball pattern, the balls being made of gutta percha, and are of such a density that they will just float in water. Expansion joints are provided at each end of the pipe and are situated just below the inlet and outlet pieces. The inlet piece is bell-shaped, 4 inches in diameter at the upper end and tapers gradually to 30 inches. It receives the water from the bottom of the head box and is curved at the smaller end to come into line with the pipe on the hillside. The outlet piece is in the shape of a bonnet, 4 feet in diameter at the upper end and discharges the water into the vertical end of the outlet box.

At the lowest point of the syphon the pipe is provided with a 4-inch gate valve, which serves as a blow-off cock in case it is necessary to at any time empty the pipe. This valve is opened and closed by means of bevel gearing, to insure a very slow motion. The pipe crosses Stuart's Fork on a wooden bridge of the Howe truss pattern, 12 feet in width and 138 feet long. So far only about 600 inches of water have been turned through the pipe in order to furnish power for the air compressor used in connection with the driving of the tunnel that is to connect the Stuart's Fork section with the Rush creek section. This amount issues from the pipe perfectly smoothly and without exhibiting any bubbles, fluctuations or the milky appearance usually to be seen at the discharge end of inverted syphons.

Fig. 2 shows a vertical section of the flume used to convey the water from the head of the pipe line and from the pipe line to the tunnel. This shape was adopted to suit the generally steep character of the country over which it had to pass, and to obviate making too wide a flume bed in ground which requires but little to start it sliding. With this style of flume a bed only 4 feet wide was necessary. The flume, lying snugly under the bank, is to some extent protected from snowslides. There are 584 feet of lumber in each 12-foot box of flume, and as many as forty boxes were laid in a day, working from one end. As fast as the bottom and lower sideboards were laid more lumber was floated down from the head and the flume extended. The flume passes over some very rough, rocky country, necessitating a great deal of blasting. Where ravines subject to snowslides were encountered the flume was sunk in the rock or soil, so that it could not be swept out. With the completion of the long tunnel now being driven the main water system will consist of 23.85 miles of flume and ditch, three inverted syphons, aggregating 8754 feet in length, and eight tunnels, aggregating 11,134 feet, making a total length of 27.61 miles and forming one of the most extensive and picturesque mining ditches in California.

The La Grange Hydraulic Gold Mining Company's property embraces an area of 3174 acres and was bought five years ago by F. Beaudry and Baron La Grange of France.

The canal from Rush creek, 14½ miles, has five tunnels, aggregating 2118 feet in length. These tunnels have a grade of ¾ to 1 inch to the rod, and some of them are heavily timbered almost their entire length, while about seven-eighths of the ditch is in rock. These water courses are 7 feet on top, 4½ at the bottom, 4 deep, grade 14½ feet to the mile, and carry 3000 miners' inches, or 60 cubic feet, per second.

The main canal is 14½ miles in length, with a capacity of 4000 inches; upper Loveridge ditch, 4 miles, capacity 1500 inches; lower Loveridge ditch, 1¾ miles, capacity 600 inches, with five or six of minor importance, making the aggregate about 23 miles, with capacity of 7000 inches. The waters are taken from Rush, West Weaver and other creeks.

To increase the volume of water, Rush creek and Stuart's Fork are being connected by tunnel through the mountain, 9000 feet in length, 5x7 feet diameter, passing under the comb of the mountain at a depth of over 3000 feet.

At the top of Table mountain a large reservoir is supplied by the canal system, from which pipes radiate to the various giants, 15, 18 and 22 inches in diameter, and under various heads. The mine is equipped with a top sluice 108 feet in length, 6 feet wide, 3 deep, with a grade of 8 inches to 12 feet, paved with block riffles 16x16½, 11x13, 13x13, followed by ground sluices 100 feet long. Still below are forty-three boxes, 12 feet each, paved with block and stone riffles. At the end of the main sluice is a chute with right and left undercurrent, one 18x38, the other 24x46, paved with rock riffles. Grade of upper sluice is 8 to 12 inches to the box of 12 feet. The larger intervening boulders are handled by derrick. Electric plant, telephone and telegraph systems and other improved features are in the equipment. The tailings are dumped into Oregon gulch, which discharges into Trinity river above Junction City, and in that region there is no vexatious question of debris.

The two views on the opposite page show the line of flume and the pipe line, and will give some idea of the work. They are engraved from photographs taken especially to illustrate this article.

In connection with this it is to be noted that such work presents some engineering problems that must be satisfactorily solved as the work progresses; a hoisting machine, a trolley cable, power, etc., are necessary to handle such large pipe, each 48-foot section of which will weigh 340 pounds.

Beginning with the issue of Nov. 27th, '97, has appeared a series of articles on practical hydraulic mining, of which the above is the close, the first and last illustrating the latest and largest enterprises in the northern part of California.

The Bromine Extraction Process.

The following particulars of the above-mentioned process are furnished by H. F. Brown to E. D. Peters: In response to your request for information in regard to the "bromine process" of gold extraction, as carried out at the Nellie Bly mill at Boulder, Colorado, I take great pleasure in submitting the following statement, which I think will be sufficiently in detail for you to gather the general idea that forms the distinctive features of the "bromine process." My knowledge of the practical workings of the process begins with the erection of the Nellie Bly mill, which was built as an experimental plant, after drawings made by me. The mill consists of the usual appliances for fine crushing with Cornish rolls, a roasting furnace, mechanical cooling-hearth, etc., arranged practically as in an ordinary dry-crushing mill for chlorination. In addition to the barrels were solution tanks, tanks for precipitation, and columns for recovering the bromine. The Boulder ores, as you are well aware, present some difficult metallurgical problems that have proved hard to solve. The presence of tellurium renders amalgamation impossible, and no efforts at concentration have proved successful, and the ordinary barrel chlorination and cyanide gave but meager results. The richer tellurides were sold to the smelters, but the mass of the low-grade ores were practically worthless. Owing to these combined difficulties, I took more than an ordinary interest in the bromine experiment, while at the same time I thought that the experiment should be made where conditions were more favorable.

The process, in brief, is as follows: The ore is first crushed to pass a 30-mesh screen, and is then roasted "sweet." Owing to the excess of tellurium, the roasting problem was a matter of serious concern, but after full investigation it was decided that the Brown horseshoe type of mechanical roasters was best adapted for the purpose. The requirements were deemed to be frequent stirring, with a length of hearth that would insure very gradual heating of the charge, with a high heat at the finish. The process of roasting has proved a success, there being but a very trifling gold loss perceptible, after a most careful analysis, covering actual work for about one year. From the roaster the ore is carried over the Brown mechanical cooling and conveying hearth, and automatically discharged to the storebin above the barrel. The barrel is first charged with the required amount of 2 per cent solution of bromine, after which the ore charge is put in, and the barrel closed and revolved for about one hour and a half. The length of time the barrel is revolved depends largely on the fineness of the mineral, and varies from one to two hours. The solution is then forced out through the usual filter and into a storetank in the top of the mill. Up to this point the operation is exactly similar to the chlorine process. The distinctive characteristics of the bromine process consist in the recovery of the bromine and the refining of the gold. There are two tanks in the top of the mill, one for the strong solution, and the other for the solution weakened by the wash-water. Beneath each tank is a tower made of porcelain pipe about 12 in. in diameter and 20 ft. high. The column connected with the strong solution tank is filled with diaphragms placed a few inches apart, and pierced with small holes. These holes are staggered, so as to break the stream of solution as it flows through as much as possible. The column connected with the weak solution tank is filled with broken stone. The two columns are connected together at the top by means of a pipe, and at the bottom the strong solution connects with a precipitating tank, while the other connects with a store tank. Live steam is admitted to the bottom of the strong solution column and the solution admitted at the top. The small, broken streams of solution are quickly heated considerably above the boiling point, usually about 300 degrees Fahr. This releases all the uncombined bromine, which is carried over to the opposite column through the pipe at the top, in the form of gas or vapor. Weak solution is admitted in a quantity just sufficient to condense the vapors and to produce a 2 per cent solution, which goes to the store tank ready for the next charge.

This process of recovering the free bromine is very simple and requires but little attention, the attendant quickly learning to determine the strength of the solution that passes to the store tank by the color. The precipitation of the gold from the solution is accomplished by introducing finely ground sulphide of iron, and the precipitate is passed through a Johnson filter press to free it from excess of moisture, after which it is placed in stone tanks and redissolved by a bromine solution. After settling, the solution is syphoned off to another stone jar or tank, and nothing but pure bromide of gold passes over. This operation is repeated until tests show that no more gold is being passed. The pure gold solution is again treated with a little sulphide of iron, and the gold precipitated. This precipitate is then dried and melted, yielding a bar of C. P. gold.

This method of refining the precipitate is exceedingly simple; it requires but little attention, and there are no impurities to form slag, reducing the bulk to so small a limit that it is easily handled even in a large mill. The material left in the first tank after syphoning off the gold consists of silicious matter, tellurium, bromo-sulphur compounds, etc. The bromine from all these compounds is liberated by washing with a small amount of chlorine, making a complete recovery within a very small percentage of all the bromine. About all the loss that is sustained in the whole operation is the exceedingly small amount of chloride of lime and acid to form chlorine gas sufficient to free the combined bromine, amounting probably to less than 1 per cent of the loss when chlorine is used instead of bromine, as in barrel chlorination. The above is a description of the process as first used, but subsequent improvements have simplified the process, especially as to the mechanical appliances, so much as to revolutionize the whole mechanical arrangement. The chief objection to bromine is the exceedingly pungent fume, necessitating the employment of closed vessels during the whole operation, causing great expense in shipping and handling. The improvement developed during the past year consists of a process of changing the bromine to an odorless alkaline salt which can be shipped in sacks or boxes with no more risk or expense than shipping common salt, and without loss by volatilization. This bromo-salt forms odorless solutions that can be used in an ordinary open leaching tank, the same as cyan- or hypo-solutions, and retains all the remarkable properties of a gold solvent belonging to bromine as usually used. The recovery of the bromine from the alkaline solutions is virtually as described above. You will readily understand the advantages of being able to use the solutions in open tanks without loss or discomfort, as well as the great saving in first cost of a plant and the saving in power.

I suppose there are ores where the gold would be too coarse for profitable treatment by bromine, as, like all solvents, it works comparatively slow on coarse particles of gold. Should there be some coarse gold in the ore that would require too much time to become completely dissolved, the tailings can be run over silvered plates and a complete recovery made, as gold coated with bromine is very susceptible to the action of quicksilver. Where the alkaline bromo solution is used this can be done without any discomfort, as there is no odor as would be in the case of chlorine. Bromine solutions act but slowly on silver, a bromide coating quickly forming that arrests solvent action, but a bromide of silver is easily amalgamated, and I believe that the silver in mixed ores can be recovered very successfully by amalgamating the tailings, and with but a trifling expense. This is, however, but a theory, as I have not made or seen any tests to determine this point, there being no silver in the ores that are being worked in the Nellie Bly mill.

As to the necessity of roasting, I believe it is as much for the purpose of calcining the clays associated with the ores to destroy their cohesive qualities as for the purpose of eliminating the sulphur, but at least there is no more necessity of roasting than there is with cyanide or chlorine.

The use of mechanically stirred reverberatory furnaces has reduced the expense of calcining ores to so low a figure that it is no longer a question to be considered, the advantages of rapid percolation more than overcoming the small cost of calcining, and the increased extraction adding largely to the percentage of profits.

With the development of the alkaline bromo-salt it has become possible to adapt the bromine process to existing plants where open leaching tanks are used, the only expense required being to put up the necessary means of recovery, which would be but trifling.

Having assisted in designing and building the experimental mill, which has a capacity of twenty-five tons per day, I have had a great interest in the outcome, and during my frequent visits to the mill I have taken pains to examine the records of extraction, and to get posted with all the conditions pro

and con affecting the practical working of the process, and am free to say that I am charmed with its simplicity and effectiveness, and its apparent adaptability to all low-grade gold ores.

The records of regular mill work, covering several months and several hundred tons, show a saving on the difficult ores of Boulder county that will average up with the record of the best mills which I know, working much less complex ores, and under more favorable conditions.

The development of the alkaline bromine solution, and its proved efficiency, has removed all the objections I could find against the bromine process.

The process has been developed by the joint skill and efforts of Mr. Harry Cassel and Mr. Bertrand C. Hinman.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER V.

By GEO. F. BECKER.

Associated with the dikes, and manifestly connected with them genetically, are numerous quartz seams. These cut the country as irregularly as the dikes. As a rule they show neither gold nor sulphurets, but sometimes masses of pyrrhotite and a little pyrite are found in them, and in a few cases pockets of gold have been encountered, particularly, it is said, at their intersection with the reefs. It is possible that this last conclusion is an erroneous one, for the white veins nowhere contain gold so distributed as to form workable ore in considerable quantities, and it is only where they cross drifts or stopes that they are broken down. There is no way of ascertaining just how much gold has come from the pockets in the white quartz, but opinions among the managers seem agreed that it does not exceed a few thousand pounds in value. With this exception all of the gold of the Witwatersrand occurs in the banket reefs, of which by no means all carry gold in remunerative quantities.

Composition of Banket.—The banket is a highly siliceous mass, consisting of quartz pebbles embedded in a matrix composed of sand, pyrite and other minerals, all cemented by secondary silica. The large quartz pebbles have all the characteristics of vein quartz, but show under the microscope undulous extinctions and other evidences of dynamic action to which they have been subjected. They are frequently cracked, and then sometimes show veinlets along the fractures. The quartz pebbles often carry pyrite and other sulphurets, as zinc blende and galena. This was recognized by Dr. A. Koch, who states that pyrite occurs as inclusions in the quartz pebbles of almost all the conglomerates. So, too, Mr. A. Pelikan states that in the suite of specimens which he has examined pyrite is found as inclusions in the quartz pebbles. Mr. De Launay denies this occurrence. Gold and pyrite, he says, exist exclusively in the cement, never in the pebbles. In the Crown Reef mine I found more than a dozen instances of the inclusion of sulphurets in the course of a brief search, and I observed a great number of such cases in other mines on subsequent occasions. These were cases in which the sulphurets were disseminated through the quartz of the pebbles, not arranged on surfaces which might be interpreted as recemented cracks. Under the microscope I find many cases of the inclusion of disseminated pyrite in pebbles of what is plainly vein quartz. Some of the sulphuret-bearing pebbles are auriferous. One such which I collected in the Crown Reef was large enough to bear trimming, so that the outer surface could be entirely removed. The residual kernel was assayed by Mr. A. F. Crosse and found to contain gold in appreciable quantities. Prof. Le Neve Foster states that assays by Mr. Richard Smith show some of the pebbles to be auriferous. The question whether free gold exists in the pebbles has been much discussed, and has been treated as if it were a matter of the first importance in determining the nature of the gold deposits. This is quite a mistake, as I shall explain somewhat later. I was assured that free gold has repeatedly been observed in the pebbles with the naked eye, but I did not succeed in getting a sight of any such specimen. Mr. Pelikan, however, has found moss gold embedded in the quartz of his specimens, and has photographed the occurrence of gold embedded in quartz under the microscope. These photographs are published in Mr. Goldmann's work, with different tints for pyrite of gold. I possess a slide of Ferreira ore which shows gold solidly embedded in a quartz pebble.

The matrix of the banket contains most of the gold and pyrite. Some of the pyrite in the matrix is said to be in well-defined, sharp crystals, but much more of it is in the form of rolled pebbles. In some of the ores of the district it is evident to the naked eye that pyrite pebbles exist, but in most cases a thin section is needed to display them. Dr. Koch says that the grains of pyrite are generally shaped by attrition, or at least display rounding of the edges and corners. This is confirmed by Mr. Pelikan. Mr. De Launay also calls especial attention to the fact that the pyrite often occurs in grains which are rolled, or at least broken, blunted or rounded. He finds such pyrite pebbles extremely prevalent both in the Main Reef series and elsewhere. He considers the pyrite pebbles as auriferous, and mentions having observed under the microscope gold embedded in pyrite, without stating whether in these particular instances the pyrite was rounded or not. In some of the specimens which I have examined the pyrite is substantially all in the form of well-rounded pebbles, isolated from one another by sand and secondary minerals. No one who has seen such specimens would admit for a moment either that the pyrite was not rolled or that it was fractured by movement in the rocks during upheaval. The pebbles have been worn round, and the detritus has been removed. In several cases they are externally converted into a brownish-black mineral, which is probably hematite, and the conversion must have taken place before the upheaval of the banket, for the specimens are blue and fresh. The pyrite pebbles measure, on the average, one-tenth of a millimeter in diameter. In some specimens the pyrites are densely crowded into layers and the pebbly character is less apparent. Some recrystallization may have gone on in these cases, but I did not succeed in finding the well-defined crystal outlines usual in embedded sulphurets. The pyrite pebbles in many cases contain numerous scattered particles of gold, which may be seen by very strong incident light. I have observed this both in my own slides and in Mr. Johns' suite.

(*To be Continued.*)

* Eighteenth Annual Report Mineral Resources of the United States.

A Correction of Misleading Statements.

TO THE EDITOR:—A copy of the prospectus of the "Great Northern Industrial Gold Company, Limited (California)," of London, has just been handed to me. The mines it proposed to purchase are in Plumas county, this State, about seven miles northwesterly from Spanish Ranch. The proposed capitalization is £400,000, in shares of £1 each. Of this, £116,000 in shares go to the mine owners (?), £164,000 in cash go to the mine owners (?), £70,000 in shares to be sold for a working capital, and £50,000 shares to be held in reserve for the present.

No one acquainted with the property would for a moment think of placing a higher value upon it than a small fraction of the proposed purchase price of $1,400,000. I consider it the duty of every honorable man interested in the welfare of California to correct gross misrepresentations of mining property, and I desire to present some facts in relation to this property, as I have been referred to in the prospectus in the following language: "Mr. J. J. Crawford the Official State Mineralogist, also visited the mines and took thirty-eight sacks of ore from different parts, which he sent for assay to Mr. L. E. Falkenau, the Official State Assayer. The results gave an average of about one ounce of gold per ton as per his certificate received."

In August, 1895, I was engaged by C. E. Ertz (named as "Director at the Mines" in this prospectus) to examine the mining claims in Plumas county mentioned in this prospectus as a mining engineer, and *not* as State Mineralogist. I spent five days there and without any trusted assistants. My report was so unsatisfactory to Mr. Ertz that he returned it to me with a substitute, which he had the effrontery to ask me to sign as my individual report, and also as State Mineralogist. This I refused to do; he left them both and departed in high dudgeon. I did bring away thirty-eight sacks of ore, *including two of rich ore selected by the owners*, and had them assayed by Mr. Falkenau, who *is not the "official State assayer,"* nor is any one else. I was suspicious that my samples might have been tampered with, and directed Mr. Falkenau to separate the fine from the coarse stuff before assaying the latter. The milling tests which he made, with the two samples selected by the owners left out, were as follows: From the hill claims, $1.65 in free gold, and 54 cents in the concentrates; from the flat claims, $2.84 in free gold, and $1.48 in the concentrates.

At the urgent and repeated solicitations of Mr. Ertz, I directed Mr. Falkenau to remix the fine with the coarse stuff and assay it. His return—the one referred to by Ertz in the prospectus—showed the *average* of the assays was: From samples Nos. 1 to 24, inclusive, $27.28 per ton; from samples Nos. 25 to 38, inclusive, $8.26 per ton. The *average* of the assays of the *coarse* stuff was: From samples Nos. 1 to 24, inclusive, $1 89 gold per ton; from samples Nos. 25 to 38, inclusive, $3.89 gold per ton.

The comparison between the two sets of assays is interesting and instructive.

Some few years ago Mr. Jas. E. Mills, M. E., late of Quincy, Plumas Co., and of Boston, Mass., bonded the hill claims for some Eastern parties, erected a 5-stamp prospecting mill and made extensive developments. He milled over 600 tons which did not average $1.50 per ton. All reference to it is omitted in the prospectus. Mr. Henry Janin made an exhaustive examination a few months before I did, but no mention is made of his report. I also understand that J. B. Low of this city reported adversely upon the same property.

J. J. CRAWFORD, Ex-State Mineralogist.

San Francisco, Feb. 16th, '98.

Geology of the Yukon.*

NUMBER IV.

It is important in the consideration of sluices that the grade be accurately adjusted to the force of the current which flows through it, and to the length of the box. If the grade of the sluice is too small, there is a constant tendency to clog, and the accumulated gold will be associated with a very large proportion of valueless dirt, while, if the grade is too great, much valuable material may be carried off at the end of the boxes and deposited as refuse or "tailings." As an example of this latter mistake, it may be mentioned that the tailings which have been accumulated by one miner are often successfully rewashed by another.

The labor of removing the barren gravel which overlies the pay dirt is very great, and, ordinarily, this is undertaken when the thickness is not considerable. With increasing thickness the point is soon reached where the task of removing becomes so formidable that the miner will not attempt it unless he believes that there is rich pay dirt beneath. In this event, the practice is adopted of sinking shafts through the barren material to the pay dirt, and by extracting this pay dirt by means of tunnels or drifts along the surface of the bedrock. This method of working has been only lately adopted, but promises to be very important. The ordinary methods of sinking, drifting, timbering, stoping, etc., have been peculiarly modified in the Forty Mile district on account of the exceptional character of the climate, and these modifications have spread from this district over the rest of the gold diggings. Owing to the severity of the long winters, the gravels are frozen during seven or eight months of the year. The miner who desires to sink a shaft waits until the cold season arrives and then sinks through the frozen gravel, which is so firm that the shafts or drifts do not need timbering for the sake of support. In sinking or drifting, instead of employing powder and pick, as elsewhere, a small fire is built at the bottom of the shaft which is being sunk, or at the face of the drift which is being run, and thus the gravels are thawed out for some distance, and can be usually shoveled up and taken to the surface. It takes a surprisingly little amount of wood to run a drift through the frozen gravel for a long distance. In this way the pay dirt is extracted and accumulates on the surface until spring, when it is shoveled into sluices and the gold is separated by washing, panning, blowing and amalgamating, in the manner previously described. One large lump or "stope" thus excavated in the gravels of Miller creek, in the Forty Mile district, is said to have measured 64x32 feet and 19 feet in height, with only 8 feet of barren gravel between it and the surface; and yet this stood firmly until spring, when the gravels thawed and the stope caved in.

The fundamental rock of the region is a schistose granite, and lying upon this is a thick series of schistose and often impure quartzite, whose situation and petrographical characters indicate a probable derivation from the granite. The schists are also graphic in places, suggesting the presence of organic life at this period. Lying upon these quartzite schists, which have been called the Birch creek series, come thick beds of crystalline marble, interbedded with quartzite schists having much the same characters as before, but grading into more highly crystalline hornblende and mica schists are often graphitic, and are often derived from impure sediments. Above this series of marbles, schistose quartzites, and hornblende and mica schists, which have been called the Forty Mile series, comes a great thickness of basic volcanic rocks, alternating with tuffs and impure sediments. This has been called the Rampart series. While the Birch creek and Forty Mile series are highly schistose, the Rampart series is, on the whole, massive, although generally joined and locally becoming schistose along definite zones. On the whole, however, there is a marked contrast in degree of metamorphism between this and the preceding formations. In the Forty Mile and Birch creek series are some dioritic and granitic dikes which have been greatly sheared along with the enclosing rocks; and there are quartz veins which are generally parallel to the schistosity, and which also have suffered great shearing. Besides the greatly sheared dikes, there are others which show less and less metamorphism, and finally some which have been entirely unaffected by any dynamic disturbance. The massive dikes, which occur in close proximity to the more or less schistose ones, invariably show themselves to be the youngest of the series. These same youngest dikes, or dikes of the same peculiar type, are also found cutting the rocks of the Rampart series.

Above the volcanic rocks and impure sediment of the Rampart series come limestones, shales, and occasional conglomerates, which, from want of knowledge sufficient for their differentiation, have been grouped together as the Tahkandit series. This series contains in different parts fossils, which indicate that it is in part Carboniferous and in part Devonian; but these are not necessarily the limits of the age of the rocks included under this classification.

*Condensed from advance sheets of "Geology of the Yukon Gold Dist. of Alaska," by Josiah Edward Spurr, of the U. S. Geo. Survey.

(*To be Continued.*)

Automatic Oilers.

It is only recently that the oiling of steam engines and other constantly running machinery has begun to be automatic. It was a long time before oil was looked upon as anything more than a saving device to keep things going comfortably, and many even now have not got so far along as to recognize oil as a necessary part of the actual running machine.

The only thing that for years was done by the builder towards the oiling of the machine or engine that he built was the drilling of a few oil holes, and these were often forgotten, though it would have been impossible to keep running without the oil. The engineer had to oil the different parts of the engine, with more or less regularity, just as much as originally he had to work the valve to let the steam into the cylinder and then another valve to to let it out again. The latter operations had to be done several times a minute, and were therefore irksome, and were soon evaded by a little ingenuity; the oiling might occur only once an hour, or even less frequently, so that the pressure on the engineer was not sufficient to make oiling automatic. Probably some could have been found in the olden times who would have suggested that the automatic oiling would make the engineer careless; so the same argument at one time or another has been used against both the automatic feed and the automatic feed stop. It was certainly many years before anything was done toward making the oiling of steam engines automatic. The proper emblem for the engineer, as most typical of his occupation, was an oil can. When a builder set up and started a new steam engine he would sometimes furnish a tray, with a handsome assortment of oil cans of different sizes and shapes, with different lengths and different crooks to the spouts.

Sight feed oilers have lately come into general use, as a necessity that has been forced by the constant running at high speed and the inaccessibility of many parts while in motion. This is at best only a semi-automatic arrangement. The engineer's emblem now has only become a big oil can or filler for the cups instead of the old squirt can. A row of engines and dynamos in some metropolitan department stores is so placed that all the visitors to the establishment may see and admire the collection of machinery; but there is a great number of oil cups to be washed and filled and kept adjusted, and one cannot but wonder why the oil, being a constant necessity everywhere, could not be distributed throughout just as the steam was distributed. Why, in fact, could not the oiling be made perfectly automatic?

The contrast to this is the engine room of a manufacturing concern with a completely automatic oiling system. There are in the engine room two horizontal engines, three or four dynamos and a steam pump, and wherever oil is needed on anything there is a pipe leading to it. All the pipes are connected to and receive oil from a vertical oil tank placed against the side of the engine room. This tank is large enough to hold over a barrel of oil. The oil is taken by the pipes from the top of the tank, and leading to the various sight feed oilers, they are all and always subject to the same pressure, so that when they are once adjusted to the required feed they need no more attention. The pressure is applied to the oil by means of water flowing in at the bottom of the tank, and a glass tube on the side always shows the level of the oil, or, rather of the water under the oil.

The device employed is a water tank located a couple of feet higher than the top of the oil tank, with a float in it, which keeps the water constantly at about the same level. This gives a gentle and sufficient pressure to the oil, and one that does not vary. Means are provided for draining the oil from the engines and returning it to a tank, where it can be filtered and used again, either in engine room or in some other place in the shop. This arrangement indicates in its completeness the post-automatic stage, or the perfected stage, of lubrication.

Electrical Storms in California.

The electric storms of California are not local to any one portion of the State over another; thunderstorms are observed as occurring on the same day over 800 miles apart, viz: at Pichacho, San Diego county, in the southeastern portion of the State, and Yreka, Siskiyou county, in the northern portion of the State.

During the thunderstorms of August 10, 1896, electric displays were observed in Siskiyou, Modoc, Lassen, Tehama, Sonoma, Alameda, Santa Clara, Mono, San Bernardino and San Diego counties. Siskiyou and San Diego counties are nearly 800 miles apart.

The greater number of thunderstorms in June, July and August are confined to the counties of the Coast Range and the Sierra Nevada range of mountains. Daily during these months the tops of cumulo-stratus and cumulo-nimbus clouds may be observed over the Sierra Nevada range of mountains, especially in the northeastern and eastern portions of the horizon.

The greater number of these storms are noted in July and August, during and at the close of a hot spell in the Sacramento and San Joaquin valleys. As the hot and moist-laden air rises it strikes the upper southwesterly current of air and is wafted over the Sierra Nevada mountains, where the moisture is rapidly condensed, forming these thunder-head clouds. It is among such clouds as these that so much sheet lightning is observed and reported by observers in the foothill and valley towns.

Herewith is a record of all electric storms reported by the voluntary observers throughout the State from September, 1891, to October, 1897, inclusive:

Total number of thunderstorms recorded as having occurred in the State of California from September, 1891, to October, 1897:

YEAR.	1891.....	1892.....	1893.....	1894.....	1895.....	1896.....	1897.....	Total.....	Monthly averages
January	..	0	1	6	5	7	6	25	4
February	..	2	0	0	1	4	8	15	3
March	..	9	4	2	3	3	7	28	5
April	..	3	2	4	5	9	5	28	5
May	..	4	7	6	4	13	10	44	7
June	..	6	0	9	5	11	15	46	8
July	..	8	8	12	3	25	4	60	10
August	..	2	0	15	6	18	17	58	10
September	2	8	6	2	7	12	15	51	7
October	1	9	0	1	10	4	5	30	4
November	0	7	3	1	0	0	....	11	2
December	2	1	6	4	3	1	....	17	3
Total	..	*5	59	37	62	52	107	†91	413	88

NOTE.—Total and average for September and October are for seven years. *For four months. †For ten months.

The greater number of these storms are reported as occurring during the months of May, June, July, August and September; the hotter the weather in summer the greater are the number of such storms observed and reported. The records of 1896 and 1867 show a greater number recorded. Possibly this is due partly to an increased number of observers and to more accurate records of those storms than during previous years, when a much smaller number was reported.

During cool summers there are much fewer electrical displays than during hot summers with long-continued spells of excessive heat. No doubt, if our summers in California were as wet and stormy as in the States east of the Rocky mountains, our record of magnificent electric displays would be equal to those of the East.

THE Geological Survey has prepared a tabulated statement showing the steady increase in the production of spelter in the United States from 1882 to 1897. The total production in short tons for 1882 was 33,765, in 1892 it was 87,260 and in 1897 it had reached 99,980 tons.

THE Merced Falls, Cal., Electric Power Co. has incorporated at Merced; capital stock, $100,000; J. G. Ruddle, Snelling; E. D. N. Lehe, Stockton; J. T. Peck, J. D. Bradley, Merced; C. E. Green, San Francisco.

Coast Industrial Notes.

—Already about $13,000,000 Australian gold has come to San Francisco this season. The Oceanic Steamship Co's. steamer Moana, which sailed from Sydney on the 15th inst., carries an additional £900,000—$1,500,000.

—The Nevada City, Cal., board of trustees want proposals for building a reservoir, trenching and refilling of necessary trenches, and furnishing 800 feet 15-inch pipe, 2650 feet 12-inch pipe, 5200 feet 10-inch, 5000 feet 8-inch, 17,000 feet 6-inch, 5000 feet 4-inch, forty-two single hydrants, fourteen double hydrants and forty gates.

—It is proposed that power from the Blue Lakes, Cal., electric plant is to be conveyed to San Francisco, a distance of 140 miles. The Boards of Supervisers of San Joaquin, Calaveras, Contra Costa and Alameda counties will be asked for franchises to erect poles along the county roads to carry the wires which will convey the power. The proposed line passes through Bellota, Linden, skirts Stockton, crosses the reclamation districts, touches Antioch and Martinez, and reaches San Francisco by cable under the bay.

—The bids for the construction work for San Pedro, Cal., harbor numbered eighteen. The lowest bid was that of Heldmeyer & New, of Chicago; they offered to do the work for $1,685,219 99. The highest bid was that of the National Construction Co., of New York, $4,595,115. The breakwater is to be about 8500 feet long, and will contain 2,069,623 tons of stone in the substructure and 221,025 in the superstructure. The contractor will be required to commence the work in thirty days after he is notified that the funds are on hand for the purpose.

—Coal mining industry in the State of Washington is active. The general activity in manufacturing and the increased traffic of railroads and steamers have enlarged the home market. The California market has also greatly improved, the shipments from Puget sound ports in 1897 having been 506,380 tons, as against 384,842 tons in 1896. The total production of the year was 1,826,224 tons, an increase of about 250,000 tons over the previous year. The number of men employed was 3698, an increase of 200 to 250 in the year. The demand has so increased, especially since the Alaska movement began, that all the old mines are being operated to their full capacity, the idle mines have been put in operation and several new ones are being opened. A new 600-foot drift has been driven at Newcastle, which is making a practically new mine of that property and a new drift 3000 feet long is being driven from Coal creek, which will crosscut all the Newcastle veins. A new property is being opened near Carbonado with a 100-foot tunnel, which cuts five or six veins of coking coal.

—The following circular from the Treasury Department is of interest: The department is advised by Canadian authorities that small American river steamers may be carried in sections from Dyea or the Stickeen river to the headwaters of the Yukon river, to be assembled there, free of Canadian customs duty, and may carry cargo and passengers from customs stations at those headwaters to Circle City and other places in Alaska. Such steamers cannot engage in the coasting trade from any place to another in Canadian territory. The stations to be occupied by Canadian customs officers at the headwaters of the Yukon are not fully determined, and their establishment will, to some extent, be contingent on the business to be done. Parties sending such steamers across to the Yukon can, however, be advised more definitely on applying to the Customs Department of Canada, at Ottawa, and given specific information as to the points of departure, etc., on the headwaters of the river. In navigating the Yukon river in Canada the usual Canadian customs regulations are to be observed. These permit only vessels of British registry to carry passengers and cargo from one place in Canada and land the same at another place in Canada. If the river steamers transported into the Yukon have American registers they may clear with passengers and cargo from a customs station on the Yukon in Canada for ports in Alaska, and vice versa. In cases of emergency, pending the receipt of registry, a clearance may, however, be granted to any of these steamers without certificate of registry on board for the first voyage down the Yukon to Alaska, but not for a subsequent voyage.

Recent California Mining Incorporations.

Lincoln G M. D. Co., Sutter Creek, Cal.; capital stock $1,150,000, subscribed $150,000; T. J. Clavering, F. F. Thomas, C. R. Downs, F. A. Voorheis, E. C. Voorheis.

El Pororrir M. & D. Co., San Francisco; capital stock $100,000, subscribed $25; E. L. Snell, A. Greth, O. M. Tupper, C. W. Marlatt, G. T. Smith.

The Badger G. M & M. Co., San Francisco; capital stock, $300,000; $25 subscribed; S. K. Bradford, E. Duden, H. W. Mathews, A. B. Bennusen, A. V. Stevenson.

Recently Declared Mining Dividends.

Mercur, Utah, 18 cents per share, $36,000; payable Feb. 20.

Elkton, Colorado, 2 cents per share, $20,000; payable Feb. 21.

N. Y. & Honduras M. Co., Mexico, 10c per share, $15,000; payable March 5.

Anchoria-Leland M. & M. Co., Colorado, 1 cent per share; Feb. 15.

Elkton Con. M & M. Co., Colorado, 2 cents per share, $20,000; payable Feb. 20.

Personal.

P. KERWIN of Virginia City is in San Francisco.

M. DOWNEY is the new Supt. B. & B. mine at Sylvanite, Mont.

GEO. W. GRAYSON of Oakland, Cal., is at Baker City, Oregon.

F. DELMAINE is Supt. Golden Treasure mine, Grass Valley, Cal.

A. RODGER, Supt. Cedar Creek mine, Shady Run, Cal., is in San Francisco.

A. W. HAWLEY, Supt. Cariboo mine, McKinney, B. C., is in San Francisco.

J. TOURTELOTH, Supt. Lappin mine, Deadwood, Cal., is in San Francisco.

J. O'CONNELL, Supt. Spring Gulch mine, Sonora, Cal., is in San Francisco.

J. M. LAKEMAN, Mgr. Wisconsin mine, Grass Valley, Cal., is in San Francisco.

A. D. FOOTE, Supt. North Star mine, Grass Valley, Cal., is in San Francisco.

T. J. HOUGHTON, Supt. Pocahontas mine, El Dorado Co., Cal., is in San Francisco.

A. A. BRANN, Mgr. Bay State M. Co, has returned from Spokane to Chewelah, Wash.

E. J. KENDALL, Supt. Taylor mine, Garden Valley, Cal., has returned from Los Angeles.

JAS. ELLERY, owner of the Three Sisters mine, French Gulch, Cal., is in San Francisco.

F. O. WOOD is succeeded by E. Smith as Supt. of the Christmas mine, Cripple Creek, Colo.

J. MCGREGOR, Supt. Diadem mine, Forest, Cal., has returned to the mine from San Francisco.

O. S. BUCKBEE, Supt. Confidence mine, Confidence, Cal., has returned to the mine from San Francisco.

D. KEITH, Mgr. and part owner of the Silver King mine, Park City, Utah, left San Francisco for Salt Lake City.

JOHN M. GLEAVES of Shasta Co., Cal., was this week appointed United States Surveyor-General in place of W. S. Green.

F. ENZENSPERGER has resigned as Supt. of the Norwegian mine, Sonora, Cal. His successor has not yet been appointed.

JOHN ROSS JR, Supt. of the Wildman-Mahoney mine, Sutter Creek, Cal., will also superintend the Potazuba mine, Sutter Creek, Cal.

JAS. E. SANDIDGE, M. E., of Denver, Colo., is in San Francisco closing the purchase of some Tuolumne county properties for his Colorado principals.

MAJOR W. H. HEUER and Lieut. H. Deakyne of the U. S. Debris Commission have returned from Smartsville, Cal., where they were in consultation with State Debris Commissioner J. F. Kidder.

Commercial Paragraphs.

THE number of arc lamps manufactured and shipped from the factories of the General Electric Co. within the past fiscal year has exceeded 24,000. Many thousands of the General Electric enclosed arc are now in service and the introduction of the alternating enclosed lamp has still further increased the sale.

THE Vulcan Iron Works of San Francisco are building a wire-rope tramway for conveying cordwood across the Colorado river to supply the mill of the Temple Bar Con. M. Co.; also an hydraulic hoisting apparatus for raising and lowering the ferry slip apron connected with the ferry service of the Union Colliery Co., Vancouver Island, B. C.; also miscellaneous mining machinery—rock breakers, ore feeders, hydraulic giants, etc.

THE 40-stamp mill concentrating plant built by the Colorado Iron Works Co. for the Dexter Mining Co. at Tuscarora, Nevada, began operating on Feb. 3rd. This mill is an up-to-date one in every respect, the ore being handled automatically from the time it is mined until it reaches the tailings pond at the cyanide plant. The Colorado Iron Works Co. have closed a contract for a 100-ton concentrating plant. Their high-speed narrow face rolls will be used exclusively to do the fine crushing. The Fernando Mining Co. of Fernando, Mexico, are the purchasers of this plant.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING FEBRUARY 8, 1898.

598,847.—OAR LOCK—Boak & Erickson, Bandon, Or
598,624.—BUILDING BLOCK—J. Brower, S. F.
598,857.—PIPE COUPLING—W. M. Coffee, S. F.
598,898.—COT—R. F. Crooks, Pomona, Cal
598,861.—WINDMILL SHAFT—W. H. Delano, Newhall, Cal.
598,505.—ELEVATOR MECHANISM—H. B. Gale, S. F.
598,590.—OIL TANK—G. W. Gooding, Seattle, Wash.
598,509.—ADVERTISING FAN—W. L. Hall, Spokane, Wash.
598,660.—LIFTING JACK—E. & A. G. Hayford, Spokane, Wash.
598,518.—CAN SOLDERING MACHINE—A. Johnson, S. F.
598,519.—CAN TESTING MACHINE—A. Johnson, S. F.
598,603.—SULKY HOE—C. H. Malkemus, Linden, Cal.
598,741.—CABLE GRIP—Norton & Rushing, Scribner, Cal.
598,579.—BEER FAUCET—Shields, Spinelli & Martin, San Jose, Cal.
598,581.—BOX COVER—R. M. Spencer, S. F.
598,685.—SCHOOL DESK—T. J. Thorp, Forest Grove, Or.
28,273.—DESIGN—GARDEN TOOL—A. R. Foutes, Oakland, Cal.
28 263.—DESIGN—DISPLAY RACK—M. V. Shaff, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Underground Surveys.

To determine the position of the end or breast of a tunnel and its depth below the surface at that point, set up the instrument at a point outside the tunnel, so as to command as long a sight as possible into the tunnel, and also the surface of the mountain above it. If the end of the tunnel can be seen from the station, a course and distance can be taken at once to the breast, and this course and distance duplicated on the surface. Vertical angles can then be measured to the points thus determined on the surface and in the tunnel, and the calculation of the depth of the breast below the surface may be made from the data thus obtained.

In case the breast is not visible from the first station, take as long a sight as practicable to Station No. 2, and before removing the instrument reproduce Station No. 2 upon the surface as in the preceding case, thus avoiding a resetting of the instrument at Station No. 1 when the underground work is completed. At the same time measure the vertical angle to Station No. 2 in the tunnel. Set the instrument at Station No. 2, and after having obtained the back readings to Station No. 1, measure the course, distance and vertical angle to Station No. 3.

Repeat the above operations at the different stations until the breast is reached, taking any measurements of the work that may be necessary, and leaving station marks for future reference. Set the instrument over Station No. 2 on the surface and very carefully duplicate the courses and distances measured in the tunnel, at the same time noting the vertical angles between the surface stations. The vertical angles can be measured most easily by sighting to a point on a short staff at a height above the station equal to the height of the instrument.

It is advisable to explore the tunnel before surveying it, as then any difficulties can be provided for and the stations selected more advantageously. Sometimes the course from Station No. 1 to Station No. 2 is assumed as a meridian of the survey and all courses deflected from it, but it is better to use the true solar course between these stations because the field notes can then be placed in the table for calculation without further reduction.

Example.—Following is a specimen of the field notes of a survey of a tunnel both underground and surface:

FIELD NOTES.

Station.	Vertical Angles. In Tunnel.	Vertical Angles. On Surface.	Course.	Distance. Ft.	Remarks.
1	.....	.....	S. 36° 50′ W.	19.1	To mouth of tunnel.
2	+1° 18′	+10° 35′	S. 36° 50′ W.	99.1	To Station No. 2.
3	+0° 31′	+15° 43′	S. 49° 47′ W.	104.2	" " 3.
4	+0° 45′	+14° 27′	S. 40° 0′ W.	37.1	" " 4.
5	−0° 34′	+16° 17′	S. 4° 55′ E.	56.5	" " 5.
6	+3° 37′	+12° 21′	S. 71° 15′ E.	46.0	" " 6.
Breast	+3° 30′	+13° 56′	S. 77° 30′ E.	40.7	To breast of tunnel.
		−17° 56′	N. 16° 16′ E	266.57	From station on surface over breast of tunnel to Station No 1.

The following table shows the method of reducing the survey. The first six columns represent the ordinary method of reducing a traverse to a straight line. The agreement between the resultant and the check course proves the accuracy of the field work.

Columns 7 and 8 contain the vertical angles in the tunnel and the rise or fall in feet corresponding to them.

Columns 9 and 10 similarly contain the vertical angles of the courses and distances on the surface and the difference of elevations between stations corresponding to them.

The algebraic sum of the vertical heights in the tunnel gives the difference of level between the Station No. 1 and the breast; and the sum of the differences of elevation in column 10 gives the total difference of elevation between Station No. 1 and the point on the surface over the breast.

The difference of columns 8 and 10 shows the depth of the breast or end of the tunnel below the surface. The tangent of the angle obtained by dividing the sum of the elevations in column 10 by the length of the resultant distance should agree with the vertical angle read to Station No. 1 from the point on the surface over the breast of the tunnel.

OFFICE FORM.

Course.	Distance.	Latitude. N.	Latitude. S.	Departure. E.	Departure. W.	Vert. Angle.	Rise or Fall.	Vert. Angle.	Rise or Fall.
S. 36° 50′ W	99.1	.....	79.32	.....	59.41	+1° 18′	+2.24	+10° 35	+18.51
S. 49° 47′ W.	104.2	.....	67.28	.....	79.57	+0° 31′	+0.94	+15° 43′	+29.32
S. 40° 00′ W.	37.1	.....	28.42	.....	23.84	+0° 45′	+0.48	+14° 27′	+ 9.56
S. 4° 55′ E.	56.5	.....	56.29	4.84	.....	−0° 34′	−0.56	+16° 17′	+16.50
S. 71° 15′ E.	46	.....	14.78	43.56	.....	+3° 37′	+2.91	+12° 21′	+10.07
S. 77° 30′ E.	40.7	.....	8.81	39.73	.....	+3° 30′	+2.49	+13° 56	+10.10
Resultant course.									
N. 16° 20′ E.	265.62	254.90	.....	74.69	.....	Total	+8.50	Total	+94.06
									8.50
		254.90	254.90	162.82	162.82				

Depth below surface=85.56

Check: 85.56÷265.62=0.3221=tan 17° 51′.

The process of briquetting fine-grained ores, devised by Thomas A. Edison, might possibly be applied with success to the Mesabi ores, which now require an admixture of one and one-half to three times their own volume to bring about satisfactory work in furnace. Magnetic concentration would be impossible, as the Mesabi ores are not magnetic. There are enormous deposits of magnetic ore having jasper and quartz gangues in the older ranges, and the Edison process, if a commercial success in New Jersey, ought to be successfully applied here. Previous experiments in ore concentration have proven flat failures. With ore at the present prices, a concentrating process would need be very economical in order to allow a profit. The Wenstrom magnetic separator, much upon the Edison plan, was tried at Michigamme eight years ago, but, after a prolonged series of experiments, was found a failure. A $300,000 investment was made fifteen years ago at Negaunee by Philadelphia and Albany gas magnates, in the Negaunee concentrating works. After the enormous building, which was the largest wooden structure ever erected, had been filled with costly machinery, built to order, it was found that the specific gravity of the ore and its gangue of jasper was so nearly the same that it was practically impossible to separate ore from rock by gravity and washing. A $3-a-day miner with $5 worth of material could have demonstrated this fact in a week's experimenting, but nobody happened to think of experimenting before the plant was built, there being almost a panic on the part of the gas men for fear that some one else would think of the same thing before their mill was completed.—American Manufabturer.

Petrified Forest Protection.

Land Commissioner Hermann is at work on a special report to the Secretary of the Interior, recommending that a forest reserve be made out of the petrified forest of Arizona.

Recent reports received by the Interior Department about the condition of this forest indicate that it is rapidly being used up for commercial purposes, and, unless the Government steps in to stop the despoilment, the whole forest, which is one of the greatest natural curiosities in the world, will disappear. There is now building in Denver a hotel, all the walls of which are to be faced with the silicified wood to be taken from the forest, and all the tables for the hotel are also to be made of it. At this rate of consumption it would not be long before all the petrified wood would be used up. Commissioner Hermann thinks that there is immediate necessity for action on the part of the Department. It is his opinion the best way in which the forest can be preserved is to make it a forest reserve.

The forest is located near Holbrook, in Apache county, Arizona. The largest and finest specimens of silicified wood in the world are taken from it. Whole trunks of trees and stumps with portions of the roots are found there, converted into stone as dense and hard as the finest agate. Every cell and every fiber of the former wood is preserved in stone. A forest of trees appears to have been entombed in the rocks and to have been preserved by a slow process of replacement by silica from solutions permeating the bed. Subsequently the surrounding sediments were washed away but the enduring fossils of the trees remained.

Tons upon tons of specimens have been taken away by collectors and dealers. A company has been formed in South Dakota for cutting and polishthe stone for architectual and decorative work. Sections of these trees, 4 feet in diameter, and large enough for the tops of tables, have been cut and polished. Many specimens were shown at the Paris Exposition, where they were greatly admired for the perfect preservation of every detail of structure of the wood, for the very high polish, and for the exquisite interblending of colors in the mass, due to the presence of various oxides in the original silicifying solutions. No other country in the world, it is claimed, can send to the lapidary such magnificent raw material of this nature as the petrified forests of Arizona afford. Not even the imperial works at Ekaterinburg, in Russia, with their wealth of kalkansto jasper, massive malachite, and other superb ornamental stones, can rival the beauty of the agatized wood of Arizona.

Commissioner Hermann is confident that Secretary Bliss will agree with him, when the facts are brought to his attention, of the wisdom of making some provision to protect this wonderful curiosity from despoilment.

To build a sewer inside of a sewer in Worcester, Mass., a coffer dam was constructed and the materials delivered to the workmen in electric scows, which worked to perfection, it is said. The sewer in that city is a large one, 18 feet wide and 13 feet high, which carried off both storm water and sewage. As it was desirable to separate the two, a smaller sewer 6 feet wide was built inside the larger one, utilizing the bottom and one side of it for the walls. A double trolley system was used in the work, the wires being hung from insulated brackets in the arch in such a way that a trolley could be run on each, two wires being necessary, one for the return current. There were six electrically propelled boats run to and fro, and they readily handled 12,000 bricks, fifty barrels of cement and 100 barrels of sand daily. Electric lights supplied the necessary illumination; electric fans provided the ventilation, and electric pumps aided largely in the rapid construction.

The largest generator for electric traction work ever built is now under construction at the works of the General Electric Co. at Schenectady, N. Y. When finished, it will be installed at the Logan-street station of the Louisville Railway Co., Louisville, Ky. On account of its large diameter the armature of this generator cannot be transported over the railroads in its completed state, either erect or on its side. The generator will, therefore, be assembled in Louisville. The completed machine will have twenty-two poles, an output of 2400 kilowatts or 3000 H. P., and will be driven at a speed of seventy-five revolutions per minute by a 4000 H. P., cross-compound engine to be furnished by the Allis Co. The generator will be constructed to stand an overload of about one-third, so that the capacity in case of emergencies may equal 3200 kilowatts or over 4000 H. P. The principal dimensions of the machine will be as follows: Diameter of field frame, 19 feet; width of field frame, 4 feet 1 inch; diameter of armature, 12 feet 9 inches; diameter of commutator, 9 feet 8 inches; diameter of shaft, 2 feet 3 inches; total weight of armature and commutator, 83,000 pounds; width of armature, 5 feet; width of commutator, 21 inches; total width of generator, 77 inches; total weight of generator complete, 174,000 pounds. Previous to the manufacture of this machine, the largest generators constructed for electric railway work were those of 1600 kilowatts or about 2500 H. P., the first of which was used in the Intramural power house at the World's Fair.

W. L. Watts, field assistant to the State Mining Bureau, during his investigations in '97 covered all the territory lying between the Santa Ana river and the western extremity of the Puente hills, within which are the oil fields of Whittier, Puente, the Santa Fe fields, near Fullerton, and other less important ones. Prospect work has also been done on new lands embraced within that area and also on the Chino ranch. The official report of Mr. Watts will be accompanied by a geological sketch map on a scale of 4 inches to the mile. This map will give in much detail the physiognomy and geological formation of the territory embraced, and which covers an area of about twenty miles in an easterly and westerly direction, and from two to five miles in a north and south. Mr. Watts has now begun an investigation of the Los Angeles local fields, including that portion of territory lying between Los Angeles and the Puente hills. He will also collect statistics for a bulletin to be issued by the State Mining Bureau, in which will be shown by counties the mineral products of California for the year '97, to be issued about May.

A substitute for German silver can be made by the use of manganese, the different metals and their proportions being as follows: Copper, 67.25 per cent; manganese, 18 50 per cent; zinc, 13.00 per cent; aluminum, 1.25 per cent. The color of this metal is said to be very good, resembling German silver closely. It is fully as strong as the bset German silver and has superior casting qualities, which will be appreciated by foundrymen who have experienced some of the difficulties in casting German silver.

A new process has been suggested that will effectively protect iron from rust. A solution of ferrocyanide is mixed with a flaxseed varnish, to which has been added a little turpentine or benzol. The evaporation of the alcohol leaves the flaxseed varnish, which forms a coat and protects the cyanide of iron, which is deposited upon the metal by the use of the ferrocyanide. The only preparation iron requires for this treatment is to remove any rust that may have formed on it which may not admit of the action of the solution.

Mining Summary.

CALIFORNIA.

Amador.

Operations at the Monte Christo have been suspended since Jan. 1st. It is assumed that the present holders of the bond from Robinson Bros. are trying to sell their option.

In the Amador Queen shaft two power drills are being used in sinking.

The owners of the Reward mine, at Pine Grove, are sinking a shaft on the ledge and are down 80 feet.

Work, which was suspended in the Alma, at Jackson, some weeks ago, has not yet been resumed.

Operations on the Ivanhoe, at Plymouth, are being resumed by Salt Lake people.

The Republican says that the Centennial mine, near Plymouth, has closed down.

A few years ago Gillick & Lyle sunk a shaft on the Stud Horse claim, encountering the ledge and taking out some valuable ore. Work was recently resumed and a new shaft sunk, going to the ledge 50 feet in depth It is 2½ feet thick, containing a phenomenal percentage of ore.

Ledger: The Iron Mass, at Robinsons, is extending levels and opening the property underground. They have 300 tons of ore ready to crush.

Dispatch: The shaft at the Oneida is sinking at the rate of 2 feet a day. They will sink 200 feet deeper, having started at the depth of 1375 feet. There is very little water to contend with.

The Reward, near Pine Grove, is sinking a one-compartment shaft on the ledge. The intention is to sink to a depth of 150 feet and then drive a level south 100 feet, to intersect the pay chute worked at the surface. The rock is looking well in the shaft.

Butte.

The Banner mine, four miles from Oroville, is locally credited with being "the deepest mine in the State." There are shafts in Nevada and Amador counties—the Kennedy and Idaho—2200 feet deep, and the Banner shaft is only 1000 feet deep, but the fact that the bottom of the shaft is 500 feet below the level of the sea is cited.

F. P. Martin, at Bidwell Bar, from a limited run in one day cleaned up $40, of which a large nugget weighing $20.83 was a part.

That quartz ledges go deep in this county, says the *Mercury*, has been demonstrated at the Banner mine, where the bottom of the shaft is 500 feet below sea level. The English owners of the Petewood drift gravel mine, near Magalia, have decided to open it up by a new tunnel.

The Clark Bros. have been blasting dirt on their claim at Yankee Hill and are ready for water.

L. Denny has begun to open up the old Barteece claim, near Concow.

Calaveras.

(Special Correspondence).—The sale of the Royal mine, near Copperopolis, was announced in the MINING AND SCIENTIFIC PRESS in the issue of Dec. 4th, '97. The purchaser, as stated, is J. C. K. Van Ee of London; the sellers are I. R. Wilbur of San Francisco and Peters & Cassell of Stockton. The price is $400,000. The property consists of six claims, of large ore bodies which thus far have been of low grade. The shaft is only 700 feet. It is to be changed to a three-compartment and sunk to 1200 feet. Sixty stamps are to replace the present twenty, and new hoisting works will be erected. The property is within three miles of this place. The examinations of the property for the London purchaser was made by W. P. Miller of San Francisco, W. R. Beall of South Africa, J. Barr of Scotland and W. R. Farish of Colorado. Their estimates foot up the "ore in sight" at 105,000 tons.

Copperopolis, Feb. 12th, '98.

The Melones Development Co. at Robinson's Ferry has been succeeded by the Melones Mining Co., incorporated under the laws of West Virginia, and is now running a tunnel on the property held under bond by the company. They have opened the South Carolina mine, which had a tunnel 1200 feet long, and starting from that point are driving it 1520 feet farther. The drills commenced work Jan. 3rd and are averaging 54 feet per week. The tunnel is 6x7 feet and traverses at present greenstone and stringers of quartz.

Supt. Regan has finished reopening the old incline from the surface to the bedrock in the El Encino mine at Mokelumne Hill. Present indications are said to be favorable for rich gravel.

At the Hog Pen mine an open cut 80 feet and a tunnel 90 feet in length have been run.

Work goes on at the Great Western mine. A new vein was recently struck in running a crosscut.

A new 20-stamp mill is being erected on the Lightning mine.

The ditch intended to conduct water to the Jupiter G. M. & W. Co.'s claim at Dogtown is completed. It is of 2000 inches capacity and twenty-one and one-half miles long. Everything is in readiness for operation as soon as the rain sets in.

Echo: Some rich ore has been discovered in the Finnegan mine at Carsons.

Citizen: The California Exploration Co. has given up the Gottschalk mine.

El Dorado.

(Special Correspondence).—M. J. Williams, one mile south of the old Springfield mine, is opening a property that gives promise of being a big mine. The shaft has reached 45 feet, at the bottom of which he has a ledge that mills from $10 to $12, exclusive of sulphurets. The formation is in slate, and the property is on the mother lode.

The bond on the Pocahontas has been extended for another year. It is expected that work will be resumed very soon. The parties promoting the development work are Paul A. Fusez, Rumsey, and McClure of St. Louis. They erected a stamp mill and air compressor, and straightened and retimbered the old Burlingame shaft to a depth of 400 feet. The Burke shaft has also been put in good condition, and the two, 415 feet apart, are connected at the 300 level.

The German mine, an abandoned property, has been reopened and a 5-stamp mill is in course of construction. The property was purchased about a year ago by Chas. D. Richards of San Francisco.

The Gearhart mine and mill, one and a half miles south of the old Church-Union, was purchased by Chas. O Richards of San Francisco, who has also liquidated the incumbrances.

Diamond Springs, Feb. 14th, '98.

(Special Correspondence) —The Esperanza, near Garden Valley, purchased about one year ago by an English company, has completed a 10-stamp mill and also bought adjoining claims. The old Esperanza shaft was unwatered and sinking is in progress. The ore was of ordinary grade in the old-time workings, but in the bottom of the present shaft they have come into specimen ore.

The Sunset, near Kelsey, after eighteen months of idleness, has resumed development work. There is a 10-stamp mill on this property. The prospects for this mine are growing brighter

The Big Sandy has a year's supply of ore ahead for its 10-stamp mill.

The 4-stamp prospect mill, one and a half miles north of Georgetown, owned by an Eastern company, is running on a large ledge of fair-grade ore.

Georgetown, Feb. 14th, '98.

Near Green Valley the Kipps are taking out coarse gold.

At Greenville, Clark and Robinson have decided to open up the old Greenstone mine.

Giebenhain & Co. are taking good ore from their Deutcher Bund claim, which they estimate will go $50 per ton.

The Carmelita mine, near Gray's Flat, is still running and shows good prospects.

The shaft on the Comaliti mine, ten miles west of Placerville, is 80 feet and shows a 2 foot vein of good ore. This property is being developed by a company from Alameda county.

Work has been resumed on the Pocahontas.

Dench & Craddock are doing development work within half a mile of Placerville and taking out good ore.

The Lemon mine, adjoining the town of Placerville, is producing fair grade ore.

Myers & Morrow, adjoining the Gentle Annie on the east, are sinking and taking out specimen ore.

Work at the Mount Pleasant, Grizzly Flat, is progressing.

Nugget: The Grizzly Flat gravel mine is running full blast. There are forty men employed. The property is controlled by Col. Sutherland and L. Gilson of London.

The Eagle King mine and ten stamps are running. This property is owned by Melton & Witmer of Placerville.

There are fifteen men working at the Mount Hope mine, Grizzly Flat.

In two days' work on the Hunt ranch J. Thomas secured $83.90 in nuggets, the largest weighing $20. The other large ones weighed $12 and $18.

On the Johnson mine, near Granite Hill, two shifts are sinking and getting fair prospects.

Five men are opening a mine on the ranch of W. Veerkamp at Granite Hill.

Larkin Bros. are developing a portion of their property, three miles east of Placerville. They struck a 6-foot ledge of pay ore.

Kern.

The shaft on the W. J. Bryan, at Johannesburg, is down 80 feet, with good ore on the footwall. Four lessees are at work in different localities of the mine and making good wages.

The Rademacher mine is down 150 feet, with some drifts and crosscuts, and has 500 tons of ore on the dump that will average $100 to the ton.

The Blue Chief is improving as it attains depth. The ore averages $40 to the ton.

The Forest Springs has a tunnel and drift aggregating 150 feet with a 6-inch vein of high grade ore.

Rand: Considerable development is being done in Dutch Gap and on Dead Horse Flat.

The main shaft on the King Solomon, near Johannesburg, is being sunk as fast as two shifts can do it. Good ore is found all the way down.

The Pinmore property has been shut down until a 40-stamp mill can be built.

J. Winfield discovered a vein in the Hector claim on Bull hill and has a 100-foot lease from the Ashford M. Co.

The Yellow Aster took out $31,000 worth of gold in January. There were 136 men on the payroll at Rand Mountain.

Rodgers & Co. have a shaft 92 feet on the Income mine, with a vein of ore 2 feet all the way down.

Conklin & Baker of the Elephant are taking out good ore.

Walley & Thompson are taking out ore from the Gipsey and having it milled at Kohen Springs, with good returns.

Madera.

(Special Correspondence).—The Mud Springs mill cleaned up last week $5000 after a thirty days' run. This is exclusive of the value of the sulphurets, which are sent to Vallejo for treatment.

The 3-stamp mill on the Keating mine, adjoining the Mud Springs, is now in running order and is working satisfactorily. The motive power is a 10 H. P. crude oil engine.

The new 2-stamp mill recently placed on the Standard mine has commenced operations, the late rains having furnished a sufficient supply of water.

Russell and Bettner have located a claim, known as the Swiftwater Bill, on the extension of the Magnet lode. At a depth of 10 feet they have a 12-inch vein of $10 rock, free gold, and a percentage of sulphurets.

Gold, Feb. 14th, '97.

Mono.

Supt. Kermeen is running a tunnel on the Dunderberg at Bridgeport to tap the ledge 150 feet below the present working. The tunnel is in 175 feet and the intention is to run it 700 feet. The work of taking out ore from the upper works goes on and the mill is kept running.

Nevada.

(Special Correspondence).—The Empire, in sinking below the 2200 level, has come into very good ore. This property has been a producer since 1857, and its product is not diminishing with age. There are forty stamps in operation. R. Walker is Supt.

The Orleans, adjoining the Empire, is running a drift, which has reached 360 feet, for the Rich Hill ledge on the 800 level. Three eight-hour shifts, air compressor and electric power are pushing the work. The property comprises eighty-three acres. C. A. Brocklington is Supt.

At the Golden Treasure, a property on which after years of idleness work was recently resumed, the shaft has been unwatered and crosscutting both ways is going rapidly forward. The old tunnel has also been cleaned and is being driven on the ledge. F. Dulmaine is Supt.

Grass Valley, Feb. 14th, '98.

W. J. Rogers, in the Mistletoe mine, near Rough and Ready, has a 4-foot ledge of good ore.

The Bellefontaine M. Co. has levied an assessment of 1 cent per share, delinquent March 15th.

The Knickerbocker gravel mine, one mile west of Nevada City, will be sold at referee's sale February 23d.

Telegraph: At the Reddick gravel mine the tunnel has reached 800 feet, and the deposit is 50 feet wide. A mill will be erected to crush the gravel.

The ledge on the Gaston Ridge mine near Graniteville is 6 feet wide and opening to 40 feet in places. The rock is both low and high grade. Over $60,000 has been spent in developing the property.

Telegraph: The clean-up at the Pittsburg mine this week paid $16.50 per ton. There were forty and one-half tons milled, yielding the tributers at the rate of $7 per day. Work is going on in the 700, 600 and 500 south, and water is down to the 800. In two weeks the water will be down to the 1000 level, and drifts north and south will be run in virgin ground. The ledge where the work is being done is large. Supt. Granger says there will be 100 men employed inside of sixty days.

Placer.

Ten additional stamps are being put in the Gold Blossom mine, making thirty stamps at work.

Plumas.

Bulletin: Firmstone & Richards have resumed work in the Phœnix mine, below the Round Valley reservoir. The tunnel is in 120 feet, running along the hanging wall of the vein, which is 8 feet in width. In a milling test the ore yielded about $4 per ton the entire width of the vein.

The Treleaven Bros. are reopening the old New York mine, near Greenville. About 400 feet of the old tunnel has been repaired. Prior to the death of one of its former owners this mine yielded handsome profits.

W. S. Drury continues development work southwest of Greenville.

Standart & McGill are developing their property near Round Valley.

McLeod & Brown are giving their attention to a quartz proposition on Wolf creek, near Greenville.

B. F. Gullic is prospecting at the Hibernia mine.

Riverside.

The Blue Rock has a 50-foot tunnel on the ledge and intends to go 50 feet farther. Where it left off it has a 20-inch ledge of good ore and about sixty-five tons of good ore on the dump.

San Bernardino.

On the Hidden Hill over 100 feet of work has been done, consisting of a 30-foot shaft and a 76-foot drift on the vein, which is 4 feet wide. About $15,000 has been taken from the property in development work, and it is now idle owing to litigation. The mine is 20 miles north of Fenner.

San Diego.

(Special Correspondence).—A complete compressor plant is being placed on the Kentuck, near Banner. It is the intention to run a tunnel 1200 feet to intersect the rich Kentuck vein at a depth of about 450 feet.

By request of Mr. Brice, who claims to be able to extract gold from antimony by secret process, a sample of high-grade antimonial ore was sent him to his Chicago office about four weeks ago, under promise that he would give it a thorough test, but up to this time the Laguna Mining Co., which sent the ore, has heard nothing from it or him.

The unusually deep snow (about 3½ feet) in the mountains bordering the desert in this county put a quietus on prospecting for a time, and very much retarded mining development for a time.

Julian, Feb. 10th, '98.

Union: D. B. McIvor of Poway has discovered tin ore on his ranch, which is said to be identical with Temescal ore.

A ledge of gold-bearing rock has been discovered in the Fallbrook section.

Shasta.

(Special Correspondence).—The Three Sisters mine, one and a half miles above French Gulch, has a tunnel 400 feet on the ledge, which is from 6 inches to 3 feet wide, and of high grade ore. The property, owned by Ellery Bros., has been bonded to Motherwell & Howell for twelve months for $20,000. Work has begun, sinking from the tunnel.

French Gulch, Feb. 13th, '98.

There has been some question among observers of the operations at the big copper mine at Keswick whether it was a paying proposition or not. The Redding *Free Press* sets this at rest by showing that the company is producing about 125 tons of matte daily. This matte contains $110 per ton in copper, $13 in silver and $18 in gold, or a total of $141 per ton—a monthly yield of $530,000. As against this sum about $85,000 is paid in freights and about $115,000 in wages, improvements and other expenses, leaving a margin of over $300,000 per month for profit.

The shaft on the Kangaroo mine is on the ledge to a depth of 40 feet. The ore taken out yielded $15 per ton.

The new crusher and furnace at the Keswick smelter is about ready for work. The capacity of the smelter will be in the neighborhood of 1500 tons per day.

The Taylor tunnel, near Shasta, is in 225 feet. It has cut through fine prospects, especially in the last 100 feet of the tunnel.

Sierra.

(Special Correspondence).—The Last Chance mine, from ninety-one cars of gravel, cleaned up $1015. The cars in use measure 4½ feet by 24 by 22 inches.

Forest City, Feb. 14th, '98.

The Grasshopper mine, at Poker Flat, has struck good pay. In last week's cleanup they found two nuggets weighing $60 and $80 respectively.

Siskiyou.

L. D. Graeter & Co., of Montana, have secured four miles of Scott river, at Callahan's, for the purpose of mining it with a dredger. They have ten men at work, and are now sinking a shaft to prospect the ground.

Starr Bros. have taken some rich quartz specimens from their mine, at Oro Fino. They will erect hoisting works and sink on the property.

Bull Bros., on Humbug, have a ledge from 12 to 24 inches thick assaying $20 in free gold.

Runnels & Randles struck a vein in Hawkinsville district that is 12 to 18 inches wide, and from five tons milled they saved $40 per ton.

S. Richardson shipped some $60 ore from the Odd Fellow mine, in Fool's Paradise.

The Yreka Co., in running a tunnel through the Humbug range, find rock containing pyrites of iron and sulphurets, with small quartz stringers running through it. The tunnel is in about 230 feet.

The Starr Bros., at Oro Fino, have struck good quartz in the old Pitz mine, and are putting in machinery to work on an extensive scale.

The Hollister Co., working the old Spencer mine, on Humbug, is pushing work on the tunnel.

The Colorado Co., operating the Hegler mine, on Humbug, commenced a new tunnel, which is in about 200 feet.

Journal: The Greenhorn mine has been sold to Waybright & Heard for $12,000. This is an extensive placer mine, with a large area of bedrock blue gravel that pays with steady regularity. F. P. King is the Supt.

H. Harris is opening the old tunnel of the King Solomon on Humbug, formerly the Mockingbird mine. The ledge ranges from 4 inches to 1 foot.

The Spencer and Hegler mines on Humbug are running tunnels to strike the ledges at greater depth.

Trinity.

(Special Correspondence).—The Lappin mine situated about one mile from the Brown Bear gives evidence of becoming a permanent producer. There are six locations in the group. The company has run three tunnels, aggregating 400 feet, at a depth of 500 feet. In the prospect work the ore has been worked by arrastra, but a 5-stamp mill will be erected at once. Some of the ore is exceptionally high grade. I saw a Selby certificate showing $836 per ton.

Deadwood, Feb. 12th, '98.

The Moody Gulch G. M. Co., two miles above Lewiston, has installed a complete hydraulic plant, and is ready for work.

R. A. Skinner, from 780 tons of ore on the Yellowstone mine in East Fork, in seventy days' run of ten stamps took out $9000.

C. C. Gilman and G. McNeil, Pres. of the Montana Dredging Co., arrived at Lowden and put six men at work prospecting on Poker Bar with a view to putting in a dredger.

Tuolumne.

(Special Correspondence). —The Philadelphia Diggings, twenty miles from Sonora, are hydraulicking day and night. The property comprises 640 acres and is owned by Stockton people. The company contemplates building an eleven-mile ditch from South Fork and another thirty-two miles long from the main river, where at low mark it will supply 10,000 inches of water.

Development work on the Star continues, though the stamps are hung, awaiting water.

At American Camp the Gray Eagle mine, owned by Korbel Bros. of San Francisco, a 2-stamp prospect mill is being built. The shaft on the ledge is 100 feet. There are two ore chutes, one of which is 2 and the other 8 feet wide, the ore from one of them running $100 per ton.

At the Spring Gulch mine they are drifting on a 48-inch ledge of a good grade of ore. The formation is in slate.

In the McKinley the shaft is 60 feet laterally on the ledge. The first level, at 55 feet, is yielding good ore.

The gravel claim at Little Pine is ready for hydraulicking, awaiting water. There are 250 acres in the property.

The old Riverside quartz mine is being reopened by Dr. Plank of San Jose. He has remodeled the 10-stamp mill and added new concentrators. There are three tunnels, one of which is 1600 feet, and 1800 feet of adit

levels. The ledge is from 4 to 6 feet, of an ordinary grade of ore, but rich in sulphurets. The mill is running continuously.

The Confidence is placing a canvas plant and making additional improvements. The company ships about fifteen tons of sulphurets every month that run $250 per ton.

Blake and San Francisco people are beginning work reopening the old McKinney mine, two miles west of Columbia.

Feb. 14th, '98.

Democrat: In the Pennsylvania twenty miners are at work. D. Neagle is Supt. The main shaft is 160 feet deep. The vein is from 18 inches to 4 feet, and mills from $25 to $300 per ton free gold. The rock contains from 3 to 5 per cent sulphurets, ranging from $150 to $400 per ton.

Pumping the Wheal Perin shaft commenced last week. The shaft has a depth of 100 feet.

G. A. Helmore has bonded to a San Francisco company his mines near Jacksonville. The consideration was $6000.

The main shaft on the Norwegian is down 300 feet, with plenty of ore in the bottom and throughout the underground workings.

Retimbering and straightening the old tunnel on the Sell mine has begun.

A new mill is to be put in at the Butler mine at Big Oak Flat.

NEVADA.

The ledge on the Lion mine, at Elko, is 8 feet wide, and assays $24 gold.

The De Lamar mill treats 300 tons daily.

Next month the Peck concentrator at Pioche will be in motion. Its operation will be of interest, as the State has several propositions similar to that which inspired this undertaking, which has in view the handling of the tailings from the old Pioche mill. The dump, which contains about 70,000 tons of tailings, has been contributed to by nearly every mine in that district. The result is gold, silver and lead, with an average value of $16 per ton.

At Tuscarora twenty out of the forty stamps are dropping at the Dexter mill and handling three tons of $20 ore to the stamp daily.

The Mountain City *Times* says that Gold Creek, Elko county, may come out all right. It says: "The people who started it were amateurs at mining. Of the more than $600,000 which was expended there, not enough was spent in following ore to develop any of the well-known quartz ledges 10 feet. It is also believed that all the work done there could have been accomplished by miners for, at most, $100,000, and possibly for half that sum."

OREGON.

In Saxe creek district, Jacksonville, there are eighty-seven mining properties actively operated, fifteen hydraulic plants and twenty-six quartz mines.

The Powell Creek M. Co., near Grants Pass, has seventy-four men at work.

The Eureka Co., operating the Miller mine on Soldier creek, near Ashland, will put on six concentrators.

W. Newhouse purchased the placer claim on Gall's creek and will work it on an extensive scale.

The Soda Springs M. Co. has incorporated, with principal office at Ashland; capital stock, $60,000.

Wimer Bros., at Waldo, are running two giants on good gravel.

The Sterling mine, Jackson county, is running two giants.

Smith & Beers are running two giants seven miles from Waldo. They have several hundred acres of placer land.

New placer ground is being opened seven miles above Grants Pass.

The Jewett mine, four miles from Grants Pass, is running on $18 ore. The ledge is 8 feet wide.

According to the Baker City *Republican*, G. W. Grayson seems to have no desire to longer keep secret the fact that the Virtue has been abandoned, and recently remarked that his company had some time ago blocked out some ground which they thought would pay to mill, but a test made proved a financial failure. There is still good ore in the mine, but the heat encountered as depth is attained does much to interfere with the working of the mine at a profit. Mr. Grayson will devote some of his attention to the Climax, in the Cracker creek district. Some of the machinery from the Virtue is being dismantled for transportation to the Climax.

The *Tidings* says that the Bohemia Gold M. M. Co., southern Oregon, closed down for the season. The clean-up for the month is reported something over $13,000. In the last eleven days' run of the 5-stamp mill $6500 was the result.

In 1897 there were 501 locations, 40 affidavits of labor, 1 mill site, 5 tunnel rights and 56 water rights recorded in Grant Co.

WASHINGTON.

The first car of ore from the Gladstone group near Boundary was shipped last week.

The Republic mine at Eureka has started tunnel No. 3, to cut the vein approximately 400 feet below the level of tunnel No. 2. They expect to drive 1800 feet and the work will take a year.

BRITISH COLUMBIA.

(Special Correspondence.)—On the Blue Jay tunnel the ledge is reached at a distance of 166 feet.

The Morning Glory M. Co. is dissatisfied with the present management. Work is shut down.

The Density has not yet resumed work on the tunnel, but a start will soon be made.

Vernon, B. C., Feb. 12th, '97.

The sale is reported from Rossland of the Columbia and Kootenay mine by the British American Corporation for $275,000. The property consists of four claims.

The Monte Cristo and Colonna mining companies at Rossland have been consolidated, the owners of the stock in the two being practically the same people. The new company will be known as the Cristo Con. M. & D. Co. Each of the old companies had a capital of $1,000,000. The new company increases the capital to $2,500,000. G. Pfunder has been Supt. of both mines and will act in the same capacity for the consolidated company.

The Canadian Pacific Exploration, Limited, of London, has bought the Big Four group, half way between Rossland and Nelson, for $50,000, paying $10,000 down.

Vancouver *Mining Critic*: Over $100,000 worth of coal mining machinery, including electric coal cutting appliances, will shortly arrive at the Crow's Nest Pass Coal Co.'s mines at Coal creek, East Kootenay. The machinery is on the best modern principles.

New Mex

Davidson & Bell, at the Golden Giant mine in Pinos Altos, are sinking the main shaft. Rich gold ore is being taken from the bottom of the shaft and from the stopes on the 350 level.

The Pinos Altos Gold Co., principally owned by the Hearst family, is doing vast development work. Upon the Pacific vein they have opened an ore body at the 500-foot level which is so far demonstrated to extend 2800 feet along the vein. The ore ranges from 1 foot to 5 feet in thickness, and gives returns from half an ounce to seven ounces gold per ton.

The British-American corporation, represented at Rossland by C. H. Mackintosh, has purchased to date in Rossland nine mining properties, the amount of English money involved in the deals being a million and a half dollars. These purchases were all made since Janurary 1st. The properties included are: Joise, on Red Mountain, near the Le Roi mine, $300,000; Columbia and Kootenay, on Columbia mountain, $275,000; Great Western and Golden Chariot, $100,000; Nickel Plate, $150,000; Pack Train, $25,000; Legal Tender, No. 1 and Whoop Up.

It is locally believed that the Canadian Pacific Railway Company has purchased the Heinze smelter, at Trail.

Three hundred tons of ore per day are being shipped via the Red Mountain railway from the Le Roi mine to the smelter at Newport, Wash.

The Primrose G. M. Co. at Rossland decided last week to postpone any further work on the Seattle and Denmark claims until the surface could be thoroughly examined by an expert.

The Josie group, twelve miles southeast of Northport, after sinking a 90-foot shaft and drifting 85 feet on the lead, crosscutting is going ahead at the rate of 5 feet per day. Once the main body of ore is located, it is proposed to drive a tunnel 400 feet; a depth of 300 feet will be attained. The average cost per foot of the work up to Jan. 1, 1898, was $4.05, including the purchase price of steel, tools, blacksmith's outfit, etc.

A 20-foot crosscut has been run at the 50-foot level on the B. C. claim, Grand Forks, in solid pay ore, no wall having yet been reached.

The Oro-Denero property, in Summit Camp, will be opened up immediately.

Work has started on the B. C. No. 2 claim in Summit Camp.

A carload of Waverley ore was sent to Swansea from Revelstoke, and it will be followed in a few days by a carload from the Tangier. The ore is a silver-lead, showing gray copper. The management expect to get out six carloads a month.

There are two shifts at work on the Sovereign, near Trail. They will have 3 feet of $37 ore in the shaft.

The Canadian Mutual M. & D. Co. last week shipped twelve tons of lead ore from the Gladstone mine at Trail.

Redbaugh & Co. sold a half interest in the Rob Roy, near Deer Park, for $3000.

The Union Mint, three-fourths of a mile from Trail, is producing $20 ore.

The tunnel on the Red Point, at Trail, is in 396 feet.

THE KLONDIKE.

Dawson advices to January 3rd state that the Klondike miners have supplies to last them until the opening of spring. The latest strike in the Klondike region was made on Rosebud creek on the 29th or 30th of December. Rosebud creek flows into the Yukon about six miles above Six Mile creek. A stampede followed the report of the strike. There is a good prospect on a stream that enters the Yukon below Freeman's point, twelve miles below the Big Salmon. Birch creek is panning out well near the boundary. American creek, near the boundary, will give some of the rich Klondike creeks a close race. Franklin, Chicken and Forty Mile creeks are being worked by large numbers of men. Miller creek is producing more gold than ever.

This winter fully 200 claims are being worked at Dawson. There was some experimenting with winter drifting, but it was not a success. The greatest drawback is the foul air arising from the vegetation which decays when it is reached by the fires used in drifting. One man was suffocated, and several were overcome. This year machinery will be used in developing the mines. Pumps are needed to drain the cuts. There is not a steam pump in operation, and there are only two pumps in the Klondike region. A pump that will rise a sluce head of water 30 feet is what is needed.

Major Walsh is determined to enforce his recent order keeping out of the Klondike country all who have not 1000 pounds of food. Miners who have a smaller quantity of food will not be allowed to pass the lines at Tagish house, not even to go down the Yukon into American territory.

During December flour sold for $100 a sack, candles for $100 a box, and all other food for an average of $1.50 per pound. On January 1st prices on account of increased supplies, were down to $35 a sack for flour, and $35 a box for candles. Other supplies sold at an average of 75 cents a pound.

Old quartz miners ridicule the story that the mother lode has been discovered. Gold-carrying quartz has been found, but so far as known there has been no discoveries of quartz-carrying gold. Unless quartz is discovered this will be the last year of building in Dawson.

The principal mining towns of Alaska are overrun with people looking for employment. At Wrangel, Juneau, Skaguay and Dyea there are more idle men than there is work for. The thing has been overdone, and hundreds would leave the country if they had the money to pay their passage home.

To the miner who goes provided with plenty of wholesome food, warm clothing, sufficient money to make him independent, and, above all, a hardy constitution to stand the rigors of the northern climate, Alaska offers some inducements. There is gold, but it can be taken out only by strong, healthy men who go fully provided with food and clothing and sufficient money to meet the exactions of the transportation companies and the freight packers. At times a gale may spring up without a moment's notice and sweep everything before it. Such a gale swept the Lynn canal Jan. 31st. At Dyea there was very little wind. At Skaguay the wind was high and piercing, but the sun shone brightly on the snow-crested mountain tops. In the canal the hurricane attained a velocity of 105 miles an hour. It blew particles of snow from the mountains, miles away, and lodged them in the rigging of the steamer Oregon, 51 feet above the water.

Lumber at Skaguay varies from $60 to $80 per 1000 feet. Capital has not a dead cinch in Skagway or Dyea any more than it has in San Francisco. Five hundred dollars' worth of flour, San Francisco price, may be worth $1000 in Skagway or Dyea to-day, and to-morrow may not sell for what it cost in San Francisco.

Mountain packing is the hardest work known to man. Last year the ruling pay was $6 a day to a man to pack on his back, and $10 a day for men with horses.

During the past six weeks the steamers have landed at Skaguay hundreds of men, who have gone on the shore without as much as a nickel in their pockets. The pangs of hunger and the ice-cold winds take the charm out of the laboring man's life in these northern regions.

Carpenters are the only skilled laborers who find ready employment. They are paid 50 cents an hour for their actual working time. Their working hours are from 9 to 5. Their highest possible pay is $3.50 a day. There are hundreds of men in Skagway to-day who would do 'longshore work for 25 cents an hour, and be glad to be among the employed at that rate. The town has all the blacksmiths, common laborers, school teachers, waiters, barbers, dishwashers, etc., that it can support, and more, too. Every steamer sailing from Skaguay has applications from men willing to work their way home.

The real cold season begins between the middle and the latter part of January and continues to about April 1st. Cold feet, the lack of warm clothing, the unbuttoning of a coat at an inopportune moment may result in a cold which may turn into pneumonia. He who goes to that country, unless he be of strong constitution, takes his life in his hands.

Wages do not average much above $2 a day in Skaguay. Cost of living is about as follows:

Bunk per week at 25c per night	$1 75
Board, three meals per day at 35c.	7 35
Total	$9 10

This is about the minimum price for the cheapest accommodations. No matter whether he works or not, a man has an appetite for three meals. If he should attempt to reduce expenses by cutting off one meal, nature will not be long in asserting herself. The average laborer is paid better anywhere than in Alaska.

Klondike-bound miners are heading over the Dyea and Skaguay trails, stretched out all along the way from Skaguay to Dawson. Many become discouraged and return before they reach the summit, while others become frozen and have to be brought back. Cases of frozen hands, frozen feet, frozen ears, etc., on the White pass are numerous.

At times this winter the weather in the pass has been desperately cold. The wind blows the snow into the face of the traveler, the warmth of the face melts the snow, and the cold again freezes the melted snow, thus forming a mask of ice on the face, and the ice has to be broken to permit breathing.

Dyea still suffers from the lack of wharfage facilities. All Dyea freight is loaded upon lighters at Skaguay and towed around the point to Dyea.

Recently was published in these columns a letter from Aug. J. Bowie of San Francisco, who went to the Klondike last summer for Jas. R. Keene at a yearly salary of $25,000. Mr. Bowie is a standard authority on hydraulic mining and has contributed many valuable technical articles to this journal. What he has to say is worthy of note. In a letter to Prof. Thos. Price of San Francisco, dated Dec. 3, Mr. Bowie says:

"Note the hour and the temperature—2:50 P. M. and 20° below zero. I have just returned from a trip up the Yukon to the Klondike, only a mile above this place, and have said good-by to the sun for to-day. The mines are all frozen, and we are enjoying the pleasures of an Arctic winter with none of the comforts of civilization. Our means of transport are nominally by dog sleds, but should you for one moment think that you would enjoy a sled ride of this kind you would be sadly mistaken. A trip with dogs up here means going on 'Shank's mare.' If you ride you are thrown out by an upset, or get out because you find yourself on the point of freezing stiff, with a possibility of leaving one of your extremities in the sled.

"One thing is fortunate — we are not troubled with a wind of any kind, so that as a matter of fact I do not feel even 15° below zero here as much as I did some of the cold days in San Francisco.

"I bought a bottle of ink to-day, for which you would pay 5 cents in San Francisco, for the sum of $5, so you can have some idea of what things cost here. Meat now is $1.50 per pound wholesale; flour, $135 per sack of fifty pounds. Men are paid $1.50 an hour, and they are not worth that much per diem. Without exception this camp has fewer mining men than any other place I ever was in. They have not the slightest conception of mining. The only wonder to me is the fact that this place has been able to exist as long as it has under the terrible prices here demanded for everything. People in San Francisco—even Sloss & Co.—cannot conceive the condition of affairs here. There is absolutely nothing to be obtained, and it will be fully two years before these mines can be handled as they should be on account of the want of the ordinary essentials for work, let alone living. Wood sells here at $50 a cord. There is plenty of it, but no means of quick or easy transportation.

"To go back to the mines, they are certainly extraordinarily rich, but this present system of work must be largely or entirely abandoned and corporations must take hold and clean out this crowd of good-for-nothings and a new era will dawn. As for the Alaska Commercial Co. and the North American Transportation & Trading Co., the only two business concerns here, they must be met with a decided opposition, and traders must come in here, where there is ample room, if transportation lines are established. Situated as these companies are, they will throw every obstacle in the way of any and everybody coming in to compete with them, and thus keep up all their sales, and slowly but surely absorb all the gold output by the infamous prices of supplies.

"The Alaska Commercial Co. during the present famine has never raised the prices of any staple article and has been very just, but the North American Transportation & Trading Co., as soon as it finds out that the Alaska Commercial Co. has sold out any article, jump the price 30 per cent or more. Coal oil sells for $40 per gallon and candles fetch $1 each and are esteemed a luxury for breakfast. The restaurants are all closed, as are the bakers and butchers, and bacon is a thing of the past. The poorest whiskey made on the spot commands $5 per bottle and you can buy but little at that figure.

"Light just now is the most important proposition on hand. One cannot buy candles or oil now for love or money, and I can't say how I am going to drag out some of these long nights. I have only spent one night in the town, as the place is absolutely too disgusting for anything. Gin mills, loose women, dance houses, gambling houses and other delicacies of the same order are rampant.

"There is not the slightest doubt that many a poor fellow has died en route here and will never more be heard of. A man who came in the other day via Dyea told me that on the way down he saw men's arms sticking up out of the ice (the body being out of sight) grasping oars, planks and pieces of wood which the poor fellows had grabbed as they were drowning in the ice floe.

"The famine here cannot be pictured in too awful a form, and soon the fuel will give out on us, as men cannot work without food, and there is no food for woodcutters. Yesterday a poor woman in town who earns a scanty living by making fur caps was sitting in her cabin sewing, with her feet resting under a Yukon stove (a mere sheet-iron box). Not being a capitalist, she had only green wood to burn, and not much of that. This kind of wood gives out very little heat, and when the poor creature tried to arise from her seat she found that both feet had been frozen as far as the ankles. Needless to say, she had to have them both amputated.

"Some large sales have been made here to Eastern parties, $324,000 having been paid for three claims on Bonanza creek and $24,000 for two others. Twenty have been bought on El Dorado creek for $100,000. Sulphur and Dominion creeks now offer the best advantages for money. The yield of all the claims will, I think, be less than last year, as there are no supplies here for labor or materials to work with. And the famine is sure to kill off many laborers. If I do not starve to death, I shall be very lucky."

Another pilgrim writes: "To men of small means who imagine they see in this Territory opportunities to make fortunes, and who, notwithstanding all that has been said so far about the difficulties to be encountered at every point along the journey, and the probable disappointments which await them on their arrival here, are still willing, perhaps anxious, to start on the journey to the new El Dorado, my advice can be summed up in one word—don't.

"There are many disappointed, heartsick men working on the dumps here, winding on a windlass, exposed to the rigors of the climate, and with the thermometer standing at from 35° to 60° below zero—and there is worse to come—who had been advised not to attempt the trip. Many of them, while grumbling about the hardships which they have, and are still enduring, blame the newspapers for having brought them here. True, some of of the more sensational papers did give a great amount of space to that part of the story which described the riches of the district than to the other side which told of the dangers and hardships, but in looking over a lot of clippings which I brought with me, I find columns of matter advising only those who were well fitted in every way to withstand hardships and privations of the most severe nature, and who knew from experience something of the nature of the life they would be compelled to live here to attempt the journey.

"And yet they are here, and while they tell you their troubles and figure out how small, after all, is the remuneration at $1.50 per hour—and the average wages here are $1.25, while many are working for their 'grub'—for six or seven hours a day, they urge the writer to advise others to stay away.

"It is feared here that there will be another rush—many are, perhaps, already on

the way. Nothing but disappointment and loss await those who come. I shall try to explain a few of the reasons why this is so.

"The mining district known as the Klondike region comprises only two creeks that are known to be rich—Bonanza and its tributary, El Dorado. Every claim on the creek bed, as well as all the bench claims, have been located. Not all the claims, even on these two creeks, are known to be rich enough to pay the expenses of mining them at the present rate of wages—which are, after all, only sufficient to pay living expenses. Others are fabulously rich. Some of those on El Dorado will yield, perhaps, $500,000 each, while others adjoining them will not pay for the working. The same is true of Bonanza.

"There are many other creeks hereabout, every one of which, lying within a radius of fifty miles, has been staked from mouth to source, and, in many cases, to a point beyond the summit of the slope from which they run. There is, therefore, absolutely no chance of success, for there are hundreds of men here now who have spent anywhere from three to fifteen years in the Yukon districts prospecting for the gold which is said to be there, and who are still looking with longing eyes for the fortune for which they have hoped so long. When men who were within fifty miles of Dawson when the strike was made are still without the means to buy food for the winter, how can a man 5000 miles away from here hope to pick up a rich claim in the Klondike region? There are many such here.

"I cannot, knowing as much as I do of the country, use language strong enough or convincing enough to advise those who are thinking of coming to this desolate country to give up the notion. No matter how discouraging may be the outlook at home, I can assure you that there are more avenues through which to make a living, and perhaps a comfortable fortune, at home than are presented by the seemingly rich Klondike.

"There are hundreds of men here to-day who mortgaged their little homes and left wife and children poorly provided for in order to raise the necessary money to make the trip to a land which promised so much. They spent every cent of that money, which represented the labor and savings of years, in getting over the Skaguay and Dyea trails, and bore up under hardships of which they would not have thought themselves capable, in the hope of getting possession at the last of a rich claim in this region, where they had heard that men became rich in a day.

"To-day they regret their madness and curse the day when they gave up all—and received nothing in return. Many have not even reached the new El Doredo. Money 'played out,' and they were compelled to winter on the pass, while others were frozen up in the river and will either have to haul their outfits down on sleds or to live in idleness and eat the food which, on an average, cost them more than $1 a pound to get over the pass.

"The richest deposits of gold are found in the crevasses of the bedrock, which here is a kind of soft slate, and so in most of the mines the rock itself is worked out to a depth of from 1 to 4 feet. The bed of the creeks—Bonanza and El Dorado—is wide, and, as the deposits are on the bed of a former creek, or glacier, which wound about in totally different directions to the present creek, it is impossible to locate the 'pay streak' except by sinking shafts in the slow and laborious manner practiced here. It so happens that ten or more holes may have been dug on a lay without the pay streak—if any there be there—being located. Several weeks' work has been done, and there is nothing to show for it. True, the next shaft may strike a very rich streak, but in many cases the men become discouraged and throw up the lay.

"I might go on indefinitely enumerating the many disappointing features of this region, and the many reasons why it offers to the poor man no real inducements at all, but enough has been said already to set people thinking before staking everything on the chance of making a fortune in the gold fields of Alaska. I have talked with many old miners here, some of whom have spent long, weary years in the country, hoping at some time to stumble onto a fortune, but with very few exceptions—indeed, all—have found it impossible to make more than a 'grub stake.'"

UTAH.

(Special Correspondence) —The Silver King mine, at Park City, is proving a surprise to its owners, and particularly so to its original discoverers. It has been preeminently a silver property, but at its present depth, 1100 feet, it has cut into an ore body that is 100 feet wide, and is not yet cut through. It is producing $11 in gold, 300 ounces in silver and 65 per cent lead.

When the Lulu tunnel of the Mercur mine was started the values ran from $3 to $4 per ton, but they have steadily increased until the whole face assays $23.60.

Development of the property of the Bullion-Beck tunnel at Tintic is progressing.

The Treasure Hill M. Co. took a lease on Julian Lane group, Tintic, to December 1st, 1900.

Shipments from the Dragon mine, at Silver City, amount to forty tons a day.

The Southern Eureka, at Mammoth, is being prospected from the 500 level

The shaft on the Picnic at Park City is 425 feet and a crosscut is being run to tap the vein. A carload shipment was made in December.

The Uncle Sam mine at Eureka has opened a ledge said to be 100 feet wide.

Three assays from the Cleveland mine at Garden City showed $361.20, $20.80 and $9.50 gold. The highest and lowest were made from samples of the best and poorest ore, and the other from the general run of it. The body of ore is from 12 to 13 feet thick and was struck at a depth of 150 feet.

The Julia Dean at Bingham has opened a ledge from 6 to 12 inches that is said to run 63 per cent lead, 105 ounces silver and $3 gold.

The daily output of the Mercur mine is 300 tons.

The Butterfield Co., near Bingham, is shipping $20 ore.

The Mammoth at Tintic is shipping an average of ten carloads of high grade ore a week.

The Grand Central of Tintic averages a carload shipment every day, and the ore bodies continue to increase.

The Galena, at Fish Springs, shipped a carload of ore that showed at the mine 58 per cent lead and 108 ounces silver.

IDAHO.

The Geo. Smith mine, five miles from Salmon, shows a breast of ore 10 feet wide. It runs $9.90 per ton. A 10-stamp mill is in course of construction.

Men started work last week on the lower tunnel of the Granite at Wallace.

The Black Cloud, Banner and Granite are running crosscuts; the Custer, Atlantic and Silver Eagle are drifting on their leads; the Father Lode and Chloride Queen are taking out ore.

J. M. Davis has bonded the Hattie group at Hailey and put men to work.

The Tiger & Poorman Co. at Burke, during ten months, produced 15,819 tons of concentrates, worth $431,879.87 above freight and smelting charges, leaving a net profit of $139,044.69, or over $15,000 per month, exclusive of additions to the plant.

At Harpster, Rickards & Calkins uncovered a ledge carrying native copper, also showing gold values.

Mackay & Wedding are operating on a bar with good success, and the Lapwai Placer M. Co. is operating on Webfoot bar.

The Bedrock Dredging Co. of West Virginia purchased 250 acres of basin gravel near Placerville for $15,000. The company has expended $5000 in developing the ground. A dredge will be put in of 3000 cubic yards capacity.

A second ledge of good value has been opened in the Homestake mine near Boise.

The Last Chance mine has 1200 men on the payroll and last month the mine shipped 1200 tons of concentrates.

In the Cœur d'Alenes, the *Review* says local mining men are working their old mines to their fullest capacity and are spending thousands of dollars for new machinery and to develop new properties.

At Mullan, Larsen & Greenough, owners of the Morning and You Like mines, spent about $75,000 last year for improvements and now have the largest mill in the Cœur d'Alenes, with possibly one exception. Their shipments of concentrates for 1897 averages not far from 100 tons per day. From this it is figured that the profits are between $30,000 and $40,000 per month.

The Helena-Frisco has spent thousands of dollars in additions to their mill and development work, an average force of 100 men being employed in that work alone for six months, while the mill was shut down. The total expenditure preparing to make the mine a heavier producer was about $50,000.

When the Mammoth leased the Gem mill last summer it doubled its force, and its regular dividends presumably were increased accordingly, although a half-dozen men own it and do not take the public into their confidence to any great extent. It is known, however, that a dividend has been paid almost every month for years past, and so confident are the owners of continued success that it is practically decided that a mill will be erected, although no details have yet been perfected.

The Standard, commonly called the greatest mine in the Cœur d'Alenes, paid monthly dividends of from $25,000 to $75,000, with occasionally one running into six figures, until their big cave last fall, since when they have been running their mill less than half time.

The Tiger-Poorman, with the deepest shaft in the Cœur d'Alenes, and, consequently, the most expensive mine to operate, has cleared $15,000 a month above operating expenses, and counts that the 1400 feet which they have already sunk is not half the depth they can afford to work with the present grade of ore and price of product, while the ore now is decidedly better than any found in the first 1000 feet which they sunk.

At Wardner the Bunker Hill & Sullivan M. & C. Co. have bought all the adjoining properties which they could, and have spent $300,000 in improvements, and are working on their mill level tunnel—the Kellogg tunnel—which will run between two and three miles and cost $250,000, to cut their ore bodies 700 feet deeper.

MONTANA.

The properties of the Montana M. Co., fifteen in number, will be disposed of at sheriff's sale in Great Falls March 3rd.

Lamb, Dunwoody & Quirk, operating the Butte, at Radersburg, are shipping a car of ore every six weeks.

Work has been suspended for a few months on the new Parrot smelter at Gaylord, Madison county. Rumors that the company had sold their unfinished plant to the Anaconda Co. and that the latter would complete it and perhaps add largely to its capacity are unfounded. On March 1st work will be resumed at Gaylord and the smelter completed at the earliest date practicable.

The Philipsburg *Mail* says the Sinate mine in the copper district has been bonded to an Anaconda company for $200,000.

The average daily shipment of ore from Bear mountain the past week was fifteen tons.

J. D. Fletcher has secured a lease on the claims and plant of the Royal Gold mine and and plant at Philipsburg. They will begin operations immediately.

It has been computed by a Helena smelter man that the quantity of sulphur being discharged into the atmosphere in Butte alone amounts to 126,000 tons of pure sulphur per annum. The value of this material, when put into a marketable form, is $20 per ton in New York, so that the value of this sulphur, if it could only be collected and laid down in New York, would amount to $2,500,000.

MICHIGAN.

The Franklin Junior is sinking two double-compartment shafts from which, after sufficient openings underground, it will be possible to take out 1500 tons of rock per day. It is the intention of the company to build a stamp mill with a capacity to treat 1500 tons of rock per day.

MISSOURI.

Two miles from St. Clair the lately organized St. Clair Lead Mining Co. has begun mining operations. The Turkey Hill Mining Co. has a property at Moselle, six miles from St. Clair.

In southeast Missouri the largest new lead mining enterprise under way is that headed by D. P. Doak, president of the Missouri Smelting Co., St. Louis. The projectors of this enterprise have acquired 30,000 acres of land in the disseminated lead district in St. Francois and Madison counties, and will put three diamond drills at work to discover the extent of the ore body. The property is situated in a part of the State where mining and connected operations require a large investment in power, hoisting and concentrating machinery. Mr. Doak figures that the enterprise involves an expenditure of $300,000 or $400,000 for equipment of this kind, and says the outlay will be made. The St. Joe Lead Co., operating in the same section and on ore of a like character, has probably $2,000,000 or more invested in a plant.

ALABAMA.

(Special Correspondence.) -The table containing statistics of mineral production of Alabama during 1897, recently sent out from this office, was vitiated by an error in copying, and additional returns have been also received since that table was prepared. It is therefore requested that the following figures be substituted for those of the table originally sent you. EUGENE A. SMITH,
State Geologist and Sec. Ala. Ind. & Sci. Soc.

MINERAL PRODUCTION OF ALABAMA—1897.

*Coal, short tons	8,868,271
*Coke, " "	1,381,252
†Pig iron, long tons	923,895
†Iron ore, " "	3,241,846
†Limestone " "	494,655
‡Bauxite, " "	10,583
†Building stone, cubic feet	80,000

*From returns made to Chief Mine Inspector Jas. D. Hillhouse.

†From returns made to State Geologist and Sec. Ala. Ind. & Sci. Soc.

‡In addition to the above, Alabama should be credited with about 2500 tons of bauxite hauled in wagons from mines in Alabama to Cave Springs, Ga., and shipped thence by rail and credited to Georgia.

University, Ala., Feb. 7th, '98.

COLORADO.

A shipment of low grade ore from the Anna J. at Cripple Creek gave $30 per ton.

A number of new properties started the past week on Bull and Battle mountains, Victor.

Clemons & Frank of the Six Points are shipping a carload a day of $40 ore.

The Talc mine at Yankee Hill has a shaft 50 feet with 18 inches of copper-iron ore. The ore runs $17.30 per ton.

Trowe & Morrison have driven their tunnel on the Ironsides, near Eldora, 60 feet and have 40 inches of vein matter.

M. Scruggs has sold the Hazel Grace for $500.

N. McDaniel & Co. purchased the Village Belle at Eldora for $40,000, and are working two shifts sinking the shaft.

In a drift from the bottom of the 45-foot shaft in the May Queen at Cripple Creek are 10 inches of two-ounce ore.

The Vaughn, Cripple Creek, is shipping seventy-five tons of ore every week. The Fox is making daily shipments.

Miller & Co. at Cripple Creek have a vein of which 16 inches averages from $65 to $85 per ton.

Crow & Swarez are starting the St. Patrick under a twenty-months lease and a bond for $60,000.

The Legal Tender at Victor struck a vein studded with cubes of sylvanite, and the ore is of a much higher grade than anything yet opened in the mine. Assays range from $300 to $400.

The first shipment from the Black Girl at Ouray, consisting of two cars, was made last week.

W. O'Brien of the Center last week shipped a car of ore.

Twelve 25-ton cars were loaded at Leadville last week from the Yak tunnel.

J. D. Murphy & Co. are hoisting lead ore from the Weir shaft on the Nisi Prius.

Hoffman Bros., in the Daisy near Marble, are taking out ore that returns 160 ounces in silver, $12 in gold and 12 per cent copper. They have about 2 feet of this ore.

The Resurrection mine at Leadville is shipping 1500 tons per month of good grade ore. The mine is in the neighborhood of 800 feet in depth.

The Commodore at Creede has 300 men on its payroll.

The Modoc at Cripple Creek made a three-car shipment last week, one of them being of high grade. Returns from ten tons of first class shipped the previous week gave a value of $1000 a ton.

A recent shipment from the Gold Sovereign, Cripple Creek, contained ten tons of $300 ore, eight of $6, and 12 tons of milling grade.

Potvin & Vane shipped twenty tons of 4-ounce ore.

The Mount Albert Co. is driving a large tunnel at Twin Lakes.

The last shipment from the Pharmacist gave two and a half tons of sacked stuff a value of $620 a ton.

The Colorado mine at Ward was sold last week to Senator Tabor and associates for $35,000.

In the Richmond at Central City the vein is 3 feet wide and averages $40 per ton.

A 4-foot vein of iron has been opened in the Sherman lode, near Central City, carrying some free gold.

The crosscut tunnel on the Occidental, at Silverton, is under ground 102 feet, with 150 feet more to drive to cut the lead.

L. Wyman has resumed operations in his tunnel, at Silverton, 1000 feet under ground.

A. Dyatt has commenced operations on the old Tucson shaft of the Iron Silver M. Co. at Leadville.

McCarty & Lomeister are sinking on the Oro City claim at Leadville.

In the I. X. L. mine, in the new camp of Wall Street in Boulder Co., they have a shaft 65 feet deep, one tunnel 400 feet and another 600 feet. A crosscut 20 feet near the breast of the long tunnel is to be extended at once to a distance of 50 feet, at which point, according to a recent survey, it will tap the ore shoot immediately under the shaft and 300 feet from the surface.

Silverton *Standard*: The suit of Samuel Lesem against J. S. Updegraf in Division I of the District Court is concluded and judgment found for the plaintiff for $2196—the value of the machinery in the Veto mine, Clear Creek county. The court's decision is upon a point never raised before in this State. It establishes for the first time that where a man takes a mining property under a bond and lease with nothing expressed as to what shall be done with the machinery for exploitation, such machinery belongs to the lessee, and the latter had a right to remove it at any time during the life lease; and if the lease be forfeited for any reason, he can remove the machinery within a reasonable time after such forfeiture.

NEW MEXICO.

The Peerless mine, on Red river, will at once be reopened.

A. Conrad is striking good ore in development work on the Betsy, near Bland.

Wilson & Bruce are making headway in the lower level of the Crown Point mine, at Bland.

The Simpson smelter, at Copper Flat, is again running. The Hanover mine is working thirty-five men, and turning out sufficient ore to keep the smelter employed.

The Gilchrist smelter in Santa Rita was started last week.

The Pacific has opened an ore body at the 500 level which extends 2800 feet along the vein. The ore ranges from 1 foot to 5 feet in thickness, and gives returns from half an ounce to seven ounces gold per ton.

The 100-foot mark was reached in the Cotton tunnel, at La Belle. The greatest depth to be gained is 1000 feet. Besides the sixty-five acres of leased ground covering the site, this tunnel will develop the mineral hill west of camp on which is located the Louise, 50 feet of tunnel; the Senator Vest, 150-foot tunnel; the Boston group, 100-foot shaft; the Criterion, 70-foot shaft; the Victor and Oro of the Hudson Co., 50-foot shaft, all of which claims have returned assay values ranging from $3 to $15 per ton.

ARIZONA.

(Special Correspondence).—The Vulture mine, fifteen miles west of Wickenburg, will resume operations soon. The new company is planning to open the mine by new workings. This property, which is credited with a production of several million dollars, was foreclosed by some of the present owners on a claim of about $17,000. The tailings at the old mill were estimated to be worth, at the time of the foreclosure, $100,000. At present a cyanide plant is working profitably on these tailings. Ex-Senator Tabor of Colorado has a recognized interest.

The Santa Maria Mining Co., on the Santa Maria, west of Congress, is operating a 10-stamp mill and cyanide plant.

During the past year the Congress mine has worked about 40,000 tons of ore, milled and concentrated on the ground and the tailings roasted and cyanided.

The Golden Wave mine, two miles from Congress, is being developed. The ore bears a similarity to that of the Congress. A 30 H. P. gasoline engine operates a hoist and air compressor. A mill is to be put up at the mine.

The mines at Chaparral and Big Bug, twenty miles from Prescott, are in operation. Farther south, in the Bradshaw mountains, the snows have retarded work. A railroad will be built this year from Prescott to Chaparral, Big Bug and points in the Bradshaw mountains. This line will quicken the pace of progress in those districts near Prescott, whose merits are beyond question. The road, while it will bear a different name, has the Santa Fe, Prescott and Phœnix Co. behind it, and will be up to date and its management enterprising. It will greatly aid in developing mining resources from Prescott to the Bradshaws and from the Rio Verde to the Hassayampa. WASCOTT.

Congress, Ariz., Feb. 8th, '98.

The Mexican Sulphur Co., fifteen miles below the mouth of the Hardy-Colorado, with offices in Yuma, is quarrying sulphuric material, employing fifty men. So nearly pure is the ore that the assistance of water is needed to extinguish the flames that spring up after each blast. Even the concussion of the miners' tools occasions combustion. Beside the sulphur being taken out, a vein of alum 2 feet in width, encountered in the same deposit, is being shipped.

Development work on the Jaynes mines, at Picacho, has been resumed. These mines have been worked to a depth of 200 feet. It has been decided to erect a cyanide plant. F. Guerra is the Supt.

The vein on the Fresnal claims has an average width of 15 feet, all pay ore. On the hanging wall a stringer 18 inches in width is said to run in the streak as high as $900 in gold

and $127 in silver. Development work evidences no weakening of the ledge in strength or value. The property is in the Baboquivari mountains, seventy-five miles southwest of Tucson.

The Saginaw Co., in Pima county, in crosscutting, opened a vein of ore carrying 150 ounces silver and one ounce gold. The vein is 3½ feet wide.

F. A. Smith closed a deal for Michigan parties by purchasing the Centennial group in the Gijuas district, out from Tucson. The company contemplates erecting a 20-stamp mill at once.

The South Bisbee Copper Co. has fifty mining claims in the heart of the Bisbee mineral basin.

Supt. Guerra has resumed development work on the Jaynes mines. They have been worked to a depth of 200 feet. It has been decided to erect a large cyanide plant for the reduction of these ores.

During December and January Clack Bros. took out $12,000 from the Oro Plata, northwest of Kingman. Ore now taken out shows 200 ounces silver and from fifteen to twenty-five ounces gold.

The Evans Van-Hecke Co. started their additional ten stamps at Evans Point last week and now have twenty stamps in operation. The company contemplates adding fifty more stamps.

In the Gladiator mine, Yavapai county, a 30-inch vein of gold quartz was encountered which goes six ounces to the ton.

The Detroit Copper Co. of Morenci has resumed operations.

J. Cronin has commenced the development of the El Dorado mine in Mojave county and is erecting a 10-stamp mill.

Judge Hawkins of Prescott has bonded six claims in Mojave county to a syndicate of Denver capitalists, who will immediately develop them. The propositions involve gold, silver and lead.

The *Southwest Bullion* says that the Copper Queen Co., of Bisbee, has acquired all the copper mines, hoisting and reduction works and railways of the Detroit Copper Co., at Morenci, near Clifton, and also a group of mines at Nacosari, in Sonora, which are being opened on a comprehensive scale, and to which the company contemplates extending its Benson-Bisbee standard railway.

Nine claims and several hundred tons of copper ore on the dumps were bought by the South Bisbee Co. for $30,000.

The Copper King shaft is down 540 feet, and sinking is being pushed.

A new strike of copper ore was made on one of the claims of C. A. Overlock, uncovering a 5-inch vein of copper and silver ore that will run 40 per cent copper.

Doyle & Dougherty of Tucson from fifteen tons of ore from their mine on the summit of Helmet received pay at the rate of 420 ounces silver and $70 gold per ton.

The Spencer Bros., Tucson, sold the Cabriza mine for $5000. A binding sum of $500 was paid down.

MEXICO.

In the Creston mine at Minas Prietas a vein of high-grade ore was cut on the eighth level.

SOUTH AFRICA.

In the Nourse Deep the first output during period Nov. 17th to Dec. 31st is: Number of stamps working, 60; number of days working 60 stamps 39; ton crushed by 60 stamps, 9428; yield in smelting gold from mill, 3882 ounces; tons of sands and concentrators treated by cyanide works, 4753; yield in smelting gold from cyanide works, 2217 ounces; total, 6099 ounces. Working expenditure and revenue: Sixty stamp mill and cyanide works, 9428 tons milled; to mining, milling, cyaniding, and general charges, £16,725; to profit, £5216—£21,941; by gold account, 3882 ounces from mill, £13,977; by 2217 ounces from cyanide works, £7946; by other revenue, £318—£21,941; expenditure on account of capital, £5943; value of yield per ton, £2 6s 6 53d; working cost per ton, £1 15s 5.75d; profit per ton, 11s 0.78d.

A writer in the Bloemfontein *Express* says there are 75,000 ancient gold mining holes—for they are never shafts—in Rhodesia, and he reckons that allowing only 10 dwt. to the ton, the ancients must have taken £1000 worth of gold on an average out of each, or £75,000,000 in all; and with our machinery he thinks there is at least as much left for the moderns.

AUSTRALIA.

The following is an extract from a private letter from Kalgoorlie from a mining expert now visiting that section: "This is going to be one of the leading gold-producing centers of the world. The first thing that strikes one is the enormous figures they talk about, and when I tell you that the last division of profits for six months in the Lake View Consols was £150,000, on a capital of £250,000, you will understand their having something to go upon. Callaghan, the manager, told me that his crushing this month would total some 15,000 ounces, and that when their water arrangements are completed he can quadruple the output."

The Broken Hill Proprietary half-yearly statements issued show a profit for the six months ending Nov. 30th, 97 of £111,128. The net assets amount to £531,396, and the profit and loss account shows a credit balance of £597,520. The amount expended under the heading of construction is £72,000. The average price obtained during the half year for lead was £12 7s per ton, and for silver 2s 2 9-16d per ounce. 181,716 tons of ore were treated.

SIBERIA.

A Tomsk telegram states that about Jan. 25th a lump of auriferous earth, containing 74¼ pounds of pure gold, was found in the gold washings on the Spasso Preebrashenige estate in the Minusinsk district.

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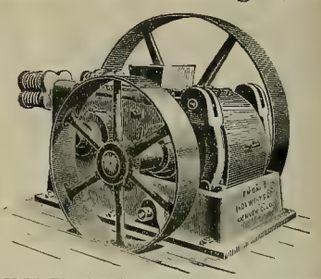
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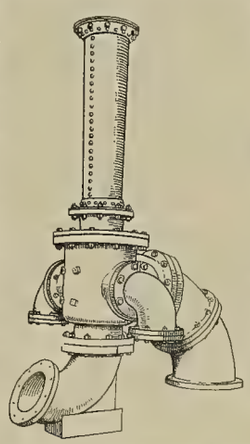
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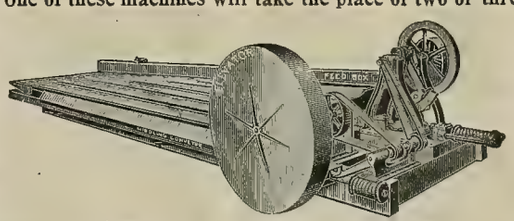
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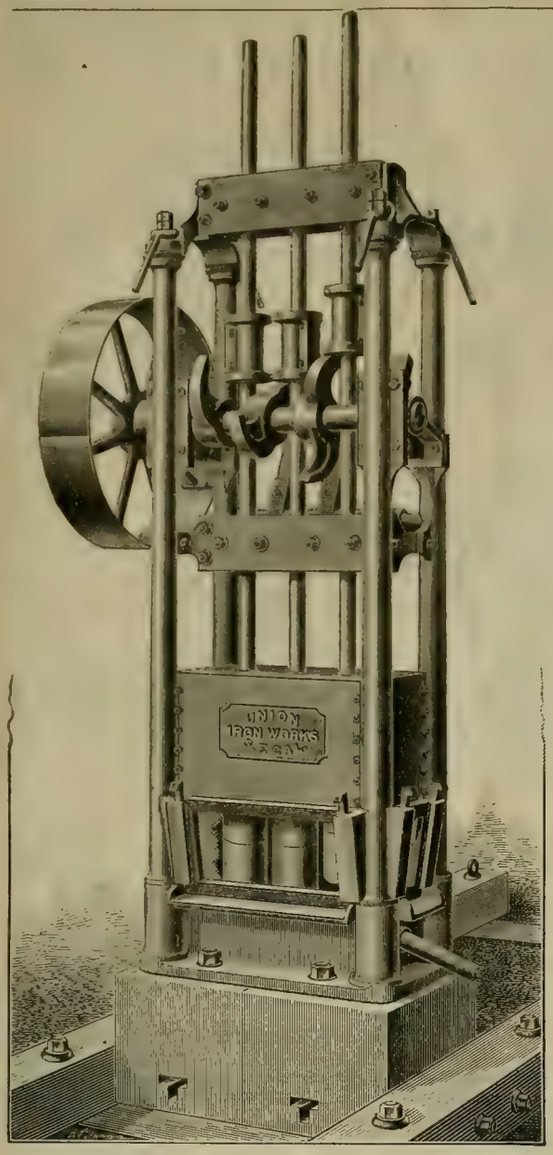


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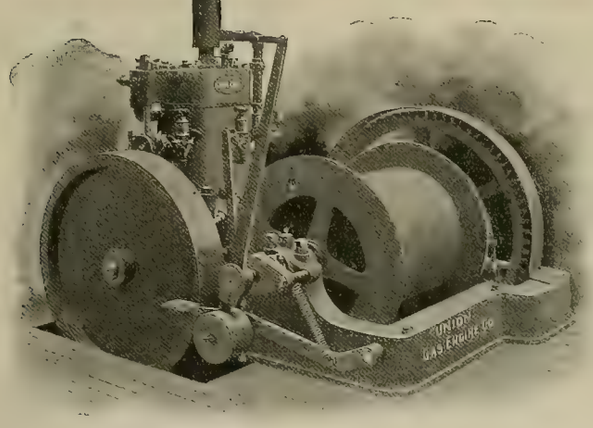
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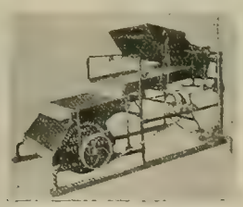


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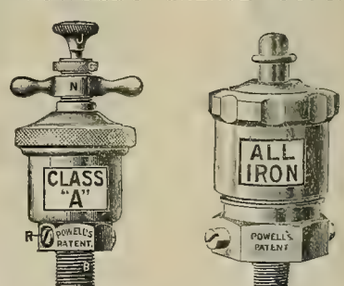
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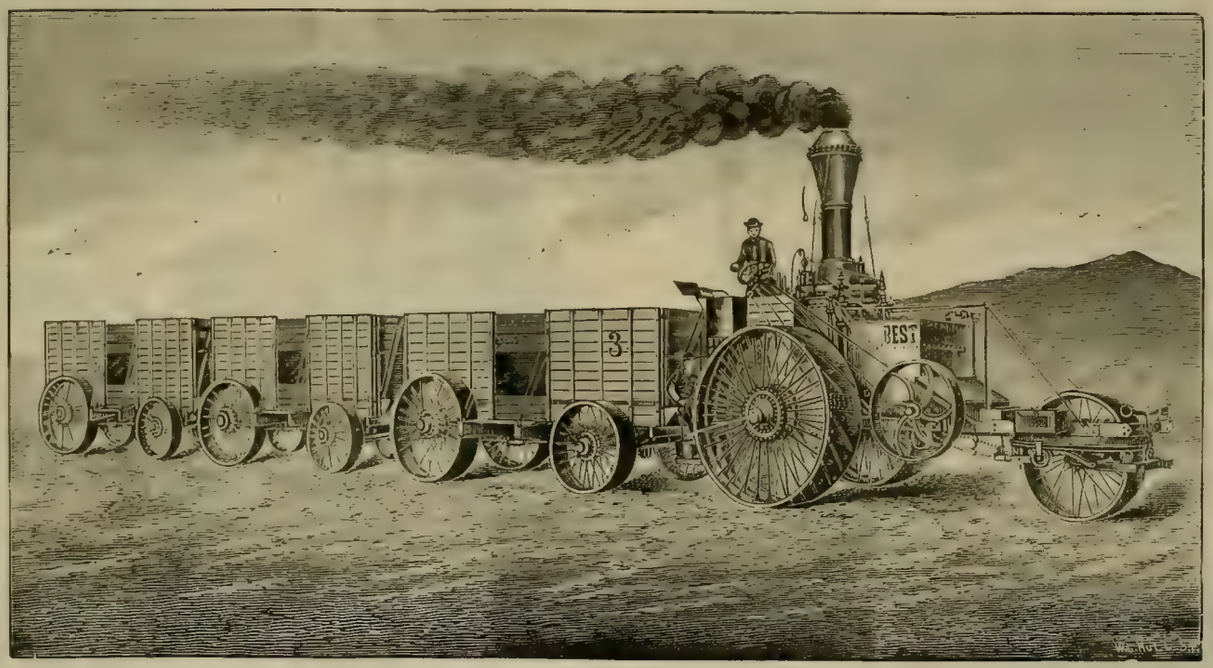
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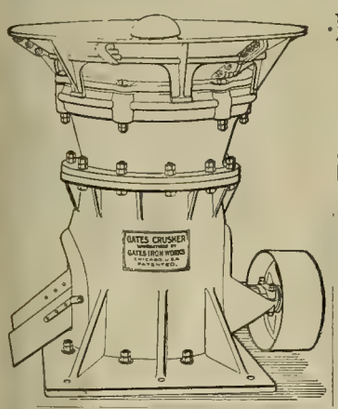
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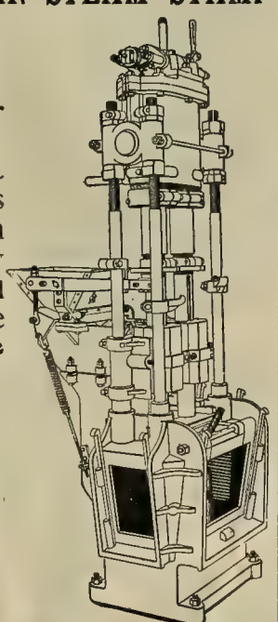
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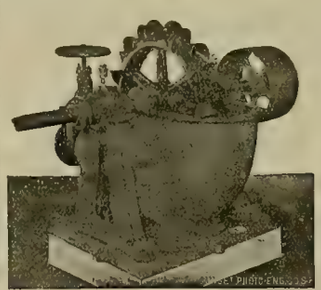
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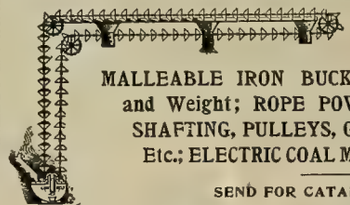
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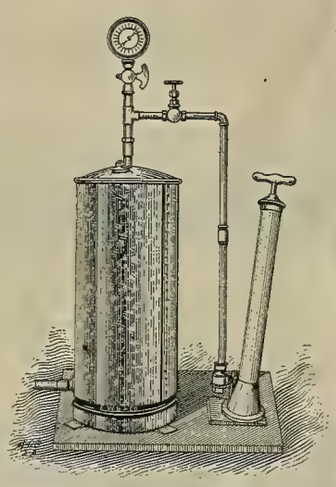
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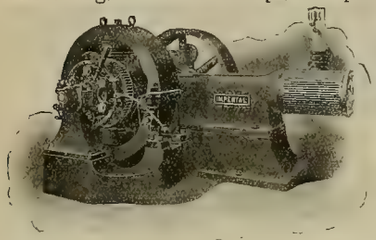
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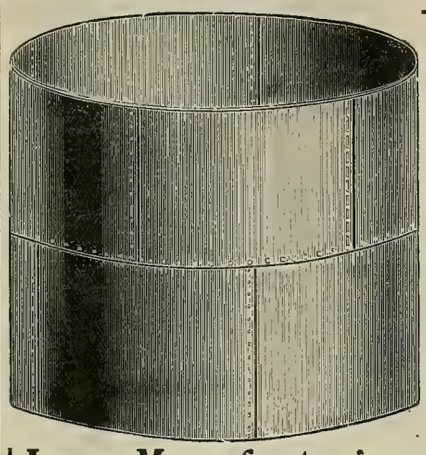
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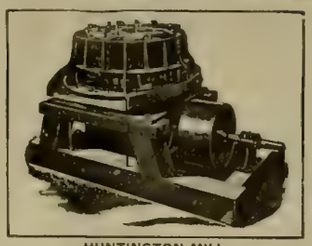
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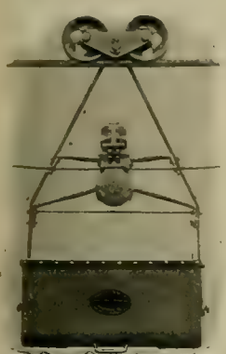
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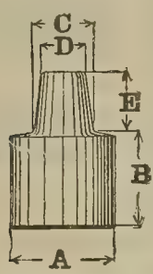
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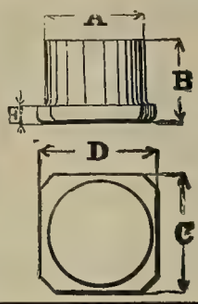
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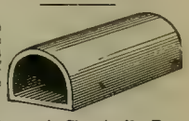
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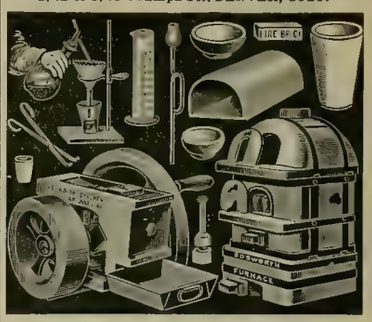
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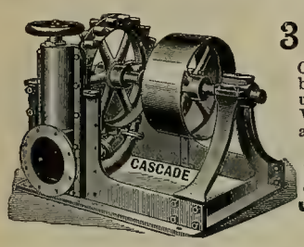
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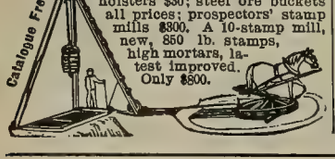
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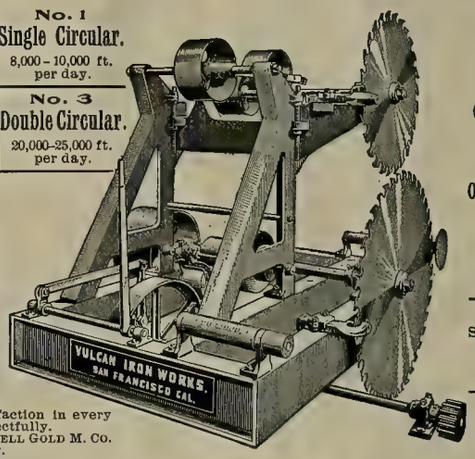
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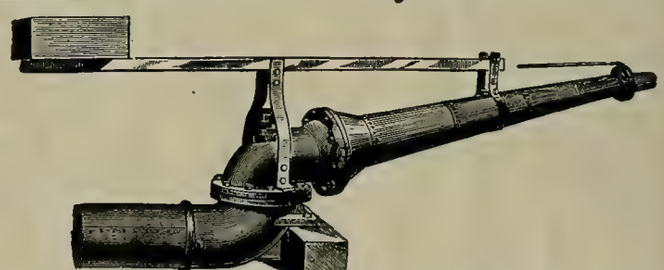
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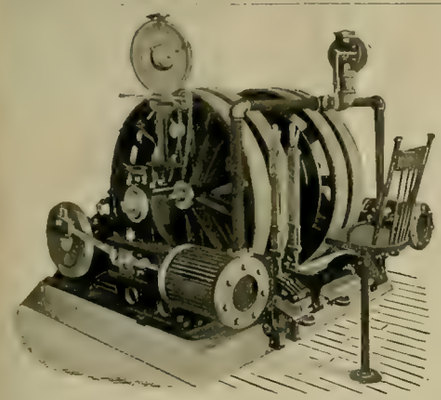
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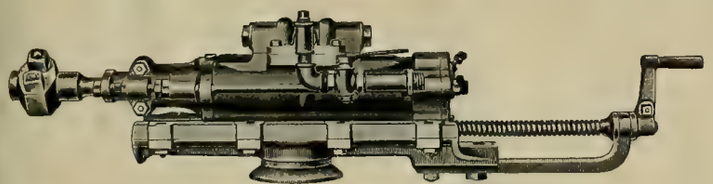
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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 17, 1898.

The demand for goods from up north is quite heavy, particularly for lines suitable or destined for Alaska and the Northwestern Territory. In this city liberal supplies are being sold to persons going to the gold fields up there, which adds largely to the general call for goods. There is an improving call from California, which would be still more pronounced if we have a good soaking rain throughout the State. While private advices report crops in about every section looking well and not suffering for rain, still an absence of rains for two to three weeks would prove quite disastrous to many localities. Jobbers seem to be waiting for weather development before pushing for trade in the agricultural districts. There is a stronger tone to the different lines of goods. In metals the markets at the East have been strengthening for tin, copper, lead and spelter, which creates a better feeling in them here.

The local money market is dull and inactive, with a plethora of funds in bank. There is nothing that indicates a speculative movement at hand in anything, while the steady shipments of products out of the State unties money which adds still more to the available funds. The disbursements in this city and up north by persons going to Alaska aggregate a large sum every week. It is stated that collections, while not free, are not close, there being very little friction. With water again available for mining purposes, freer receipts of gold bullion and gold dust are looked for from now on. The Australian steamship brought in over $2,500,000 in English sovereigns, which will be remitted and made available for circulation. This gold comes here in the usual order for exchange purposes. The East reports easy money markets in about every direction.

New York Silver Prices.

NEW YORK, Feb. 17.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	.26	56⅜
Saturday	.26	....
Monday	.25 15-16	56¼
Tuesday	.25 13-16	55⅞
Wednesday	.25⅞	56⅛
Thursday	.26	56¼

	Copper.	Lead.	Iron.	Tin.
Fri.	10 00 @11 15	3 77½	10 00@12 00	13 97½
Sat.	.... @....	.... @....	....	....
Mon.	11 20 @11 30	3 85	10 00@12 00	14 05
Tue.	11 20 @11 30	3 85	10 00@12 00	14 10
Wed.	11 25 @11 30	3 82½	10 00@12 00	14 05
Thur.	11 25 @11 30	3 82½	10 00@12 00	14 00

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.83½
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	56½
Mexican Dollars nominal	46@—

SILVER.—The markets at the East and abroad have ruled heavy throughout the week. This, it is stated, is largely due to political complications and to the fear that an international war may be precipitated at almost any time, so strained are the relations between some of the countries. The inability of China to float another loan has something to do with the inactivity. The last steamer hence for Hong Kong took out $140,000 in bullion.

MEXICAN DOLLARS.—The market is slow and easy at quotations. The steamer hence February 12th for Hong Kong took $54,618 worth.

COPPER.—Our market is strong at quotations in sympathy with higher prices at New York. That market moved up the past week owing to an active export demand. This had been looked for to follow the settlement of the engineers' strike in England and also the opening of spring business. In this country there is a good consumption, which seems to be enlarging.

Our market is quoted as follows:

Ingot casting, jobbing	—@13
Ingot " wholesale	—@12½
Sheet copper	—@16½
Bolt ¼ and 5-16, 20c; ⅜ and larger, 16½	

TIN.—The market in Europe for pig strengthened the past week, which caused a firming up at New York. The cause of the improvement is said to be due to a good demand from this country and no excessive stocks to draw from. The attempt to form a tinplate trust at the East has proven a failure, and as more factories are starting up it looks as if it will be still more difficult to control them. In our market there is an improving demand.

The market is quoted in jobbing lots as follows:

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " light, "	4 00@—

LEAD.—The market is strong at full quotations, with an advance looked for if the East moves up still more. The advance at the East is due to an active near-by call and firmer holding. European markets are no higher.

Pig	4 75	@	5 00
Sheet	....	@	6 50
Pipe	5 30	@	5 80

QUICKSILVER.—The market is steady. Shipments the past week by water to foreign ports aggregated 16 flasks to Victoria, B. C.

Our market is quoted at $39 for domestic consumption and $35@36 for export to the west coast of Mexico.

IRON.—The market is practically unchanged so far as prices are concerned, but the consumption seems to be increasing. The East reports an active home and export movement, but the supply is ample. The late advance of 50 cents for Southern is still asked, but so far as we can learn it is not paid.

COAL.—There appears to be an easier tone to the market, due to a higher temperature, lessening the demand for house coals, a falling off in the demand for steam, and free receipts by water and rail. The decision by the United States Circuit Court against the coal combine opens this market for the marketing of coal from mines heretofore excluded. Receipts of coal for the week ending with Tuesday were as follows in tons: Departure Bay, 4941; Sydney, 3047; Nanaimo, 9144; Puget Sound, 6100; Coos Bay, 400; Newcastle, N. S. W., 1030. Total, 24,622 tons.

BORAX.—There is a good demand from the East where supplies are reported light. The market is quoted as follows:

Refined, in carload lots, in barrels	7
Refined, in carload lots in sacks	6¾
Powdered, in car lots	7
Concentrated, "	6¼

ANTIMONY.—The market is steady.

POWDER.—The market is steady at current quotations.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9 to 11c, according to strength and quantity.

PLATINUM.—The market is steady.

Our market is quoted in a jobbing way at $16 per ounce and for scrap $11 an ounce.

ZINC.—The market is steady.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 45 to 50 cents per pound for ingots.

Chemicals.

There is absolutely nothing new to report in our market. The changes in quotations heretofore looked for seem to be about as far off as ever. The Eastern markets are similarly conditioned, for New York advices report nothing out of the ordinary line of business or demand developed in any branch of the market; but general distribution, particularly of the lighter goods that figure anywise prominently in the jobbing branch of the trade, is of quite good volume and up to the average. Prices remain substantially as quoted for some time past.

CYANIDE OF POTASSIUM.—The market is steady.

Our market is quoted for chemical pure 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The market is firm.

We quote in a jobbing way at 1¾c per lb for 66%.

ACETIC ACID.—The market is firm at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BONEASH.—There is a fair demand.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3¼c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady.

We quote in a jobbing way at 4c per pound.

SPELTER.—The market is steady.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is firm.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—The market fluctuates for round lots, but is steady for small.

Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

Mining Share Market.

SAN FRANCISCO, Feb. 17, 1898.

The market has been more active, with a slight advance along the line. The first improvement was noted in Challenge, which was seconded by Caledonia farther south and responded to by Con. Virginia at the north. When the latter moved up the middles showed more strength, as did others at the north end. Con. Virgina moved up to $1.10 yesterday morning, but closed last evening at 98 cents, causing the entire list to ease off in sympathy. Street points are that the morning buying was by Virginia City people, as was the selling in the afternoon. As about all the orders sent from that place are done under instructions from San Francisco, it indicates that the market is being manipulated in the interest of a combination for a small bull movement. That they expect to be able to unload at quite an advance on current prices is emphasized by the work at several points on the Comstock lode, without regard to the strong probability of an important strike on the Brunswick. Before this takes place there will be quite a line of assessments levied commencing after tax-day—first Monday in March. These assessments may have a temporary bad effect if prices are higher, but if they are lower before levied the shading off, if any, may not amount to much. The heaviness of Sierra Nevada is said to be due to dead work being done, and the trading public gets out of inactive shares into the more active. From all that can be learned, the new work mentioned last week has not been started, or, at least, official letters do not so report, but it will be started, and more beside. The decrease in the flow of water in the long west crossdrift run jointly by Con. Imperial, Challenge and Confidence is accepted as favorable, but they strike another flow farther on before striking the west lode. This crossdrift drains a large area to the west. The Bodie district ought to come to the front before long and Standard renew dividends. This company is liable to pay 25-cent dividends before 1898 passes.

The news from the Comstock mines is of a more interesting character than for over a year. The dead work in several has been completed while in some of the others it is nearing completion, which means more active exploiting. The official letter from Utah does not report any material change during the week. In Sierra on the Riley tunnel level dead work seems to be the order. Some time in next week exploiting will probably be resumed. The work on the 900-foot level is unchanged. In Union nothing new is reported; the work is to the east and on the 900-foot level. In Mexican blocking out on the 1000-foot level is still the order. Work in Ophir is to the west on the central tunnel level and also 1000-foot level. On the latter they are in about 430 feet and on the former about 900 feet. They ought to be approaching more interesting ground. On the 175-foot level in Andes they are going in a northeast direction, consequently they are not apt to strike ore. We are not advised if they have started the new crossdrift on the 1650-foot level of Con. Virginia. The work in this mine is confined around the 1550-foot, 1650-foot and 1750-foot levels. They ought to be ready for more important work soon. They are raising a few tons of ore assaying about $41 a ton. The work by Best & Belcher and Gould & Curry is jointly to the east on the 800 foot Bonner shaft. They are going west in the Savage. No work reported in Hale & Norcross. In Chollar they are repairing the main west drift on the 450-foot level. On the 100-foot level they have started a west crossdrift. On the surface tunnel level of Potosi the south drift is in quartz giving low assays—$3 to $7 a ton. Bullion valued at $3165 has been shipped. In Alpha they are still upraising on the 500-foot level. What this work is being done for no one seems to know, except to spend money and kill time. The long joint west drift of Con. Imperial, Challenge and Confidence is in over 1800 feet. The flow of water is decreasing. In the Yellow Jacket they are still working one shift, so says report, but more men will be put on soon. In Crown Point they are still raising low grade ore for testing while doing other work. In Belcher the work is the same as reported last week. In Overman they are drifting north on the 900-foot level. A few tons of ore are raised. In Caledonia they are getting ready for more active work on the 1100-foot level. Reports say they have ore on this level which can be struck within a short time after they start for it. In both Justice and Alta the prospects are of quite an encouraging character. The managements of these two mines are quite hopeful of being able to develop paying ore in quantity.

From the Brunswick lode our advices are of a decidedly encouraging character in Occidental, Potosi and Best & Belcher, but it will take more work yet to fully establish expectations based on present showing. In Occidental they have found good ore 200 feet south from where the best showing was and on the 650-foot level 400 feet north. The ore is fair grade, averaging about $20 to the ton; and as the company owns its own mill, this will pay a good profit to extract and mill. The winze has been sunk in fair grade. They will crosscut the lode to find its width, after which sinking will be resumed. It looks as if the management is developing the mine as an investment proposition, and not speculation in shares. The south drift in Potosi, 600 foot level, is in favorable formation. In Chollar no change is reported in the work under way. Joint work is being done in incline shaft No. 1. They are down 1061 feet. A station will be cut out next month and work will begin to open another level. Joint work by Best & Belcher, Gould & Curry and Con. Virginia is confined to exploiting the 600-foot level. On this level they are drifting south for air connection and crossdrifting east and west. They are also sinking the main incline. In March they will be down far enough to cut out a station and open another level.

The following illustrates the changes for the week:

Mines.	Feb. 10.	Feb. 17.
Alpha	....	....
Alta Consolidated	....	$ 20
Andes	....	14
Belcher	$ 27	29
Best & Belcher	40	45
Bodie	....	....
Bullion	....	....
Challenge	...	....
Chollar	40	....
Confidence	....	....
Consolidated California and Virginia	88	98
Consolidated New York	....	....
Crown Point	....	18
Exchequer	....	....
Gould & Curry	....	....
Hale & Norcross	1 55	1 65
Justice	....	....
Mexican	33	....
Ophir	50	55
Overman	....	08
Potosi	23	....
Savage	28	27
Sierra Nevada	95	74
Union	39	38
Utah	10	11
Yellow Jacket	....	28

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary
Alpha Con M & M Co, Nev	20	5c	Feb 1	Mar 8 Mar 29	C E Elliot, 309 Montgomery
Baliol G M Co, Cal	2	30c	Jan 26	Mar 4 Mar 28	R L Cheney, Mills Building
Chollar M Co, Nev	45	20c	Jan 8	Feb 11 Mar 8	C E Elliot, 309 Montgomery
Fall River Con G Q Co, Cal	11	5c	Jan 15	Feb 25 Apr 21	A Lorsbach, 313-315 Front
Marina Marsicano G M Co, Cal	12	9c	Jan 3	Feb 7 Feb 28	Chas Bovone, 217 Sacramento
Mexican G & S M Co, Nev	58	15c	Jan 6	Feb 10 Mar 3	Chas E Elliot, 309 Montgomery
Orleans M Co, Cal	7	10c	Feb 1	Mar 8 Mar 28	Geo O Thurston, 575 Mission
Overman S M Co, Nev	79	5c	Jan 26	Mar 2 Mar 23	G D Edwards, 414 California
Potosi M Co, Nev	49	20c	Feb 5	Mar 11 April 4	C E Elliot, 309 Montgomery
Red Cap M Co, Cal	2	$5	Nov 29	Jan 6 Feb 26	H H Martin, 125 Beale
Savage M Co, Nev	94	20c	Jan 6	Feb 8 Feb 28	E B Holmes, 309 Montgomery
Sierra Nevada S M Co, Nev	114	20c	Jan 19	Feb 23 Mar 14	E L Parker, 309 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19	Feb 26 Mar 21	A F Frey, Phelan Building

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 17, 1898.

9:30 A. M. SESSION.

750 Best & Belcher	45	300 Overman	08
750 Con Cal & Va	95	200 Sierra Nevada	74
100 Crown Point	18	50 Utah	11
100 Ophir	54		

SECOND SESSION—2:30 P. M.

100 Ophir	55	100 Utah	11
500 Best & Belcher	45	500 Seg Belcher	06
100 Con Cal & Va	98	100 Union	38
300 Savage	27	100 Alta	20
200 H. & N	1 65	100 Caledonia	40
200 Yellow Jacket	28	300 Andes	14
100 Belcher	29		

An Old Firm Dissolves.

The members of the firm of Morris & Kennedy, the well-known pioneer picture dealers of Post street, have dissolved partnership, Mr. Morris retiring. Mr. Morris has been the active manager of the firm for over twenty-six years and is responsible for bringing to the coast most of its better class of works of art, secured during his frequent trips East and to Europe. He contemplates resuming business on his own account, and after a short rest will leave for New York to establish connections and secure works of art of the highest character for the new venture.

TEN WEEKS FOR TEN CENTS!

Strange as it may seem, that big family paper, the *Illustrated Weekly Sentinel*, of Denver, Colorado, (founded 1890) will be sent ten weeks on trial for 10c.; clubs of six, 50c.; 12 for $1. Special offer solely to introduce the paper. Gold rings set with Rocky mountain gems are given free as premiums. Latest mining news and illustrations of grand scenery each week, also true stories of love and adventure. Address as above and mention PRESS. Write today; postage stamps taken.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage.

Money loaned mines.

Mining companies organized, their property experted, financed and managed.

Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated

Examine mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG,
Marquette, Mich, U. S. A

Cable Address: EDBEE.
Codes:
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BEDFORD McNEILL'S.
A B C UNIVERSAL COMMERCIAL.

Working Capital for Mines.

PACIFIC EXPLORATION COMPANY

Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 29-30 Chronicle Building, S. F.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from William N. Lamb, in the Croff Mine, near Oleta, Amador Co., to deposit tailings behind the dam of the Cambridge Mine, in Dry Creek, from B. F. Steese and O. Woehler, in the Long Ravine Mine, near Spenceville, Nevada Co., to deposit tailings in Long Ravine; and from J. W. Cummins, in the Amo Mine, near Oroville, Butte Co., to deposit tailings in Cherokee Ravine, gives notice that a meeting will be held at Room 98, Flood Building, San Francisco, Cal., on February 28, 1898, at 7:30 P. M.

PUT YOUR ADVERTISEMENT.....

IN THE PAPER READ BY THE MEN WHO BUY WHAT YOU HAVE TO SELL.

Rainfall and Temperature.

The following data for the week ending 5 A. M., February 16, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Maximum Temperature for the Week.	Minimum Temperature for the Week.
Eureka	81	21 87	34 71	28 46	42	38
Red Bluff	04	9 26	19 62	17 77	42	76
Sacramento	T	6 84	13 63	13 21	44	72
San Francisco	01	5 86	17 00	15 74	44	74
Fresno	00	3 23	8 32	6 36	40	76
San Luis Obispo	00	3 88	19 84		40	84
Los Angeles	00	4 11	11 42	10 99	40	86
San Diego	00	3 38	7 97	6 76	44	76
Yuma		1 26	4 81	2 46	40	84

DIVIDEND NOTICE.

JAMISON MINING COMPANY, Rooms 50 and 54, 120 Sutter St., San Francisco, Cal., January 25th, 1898.

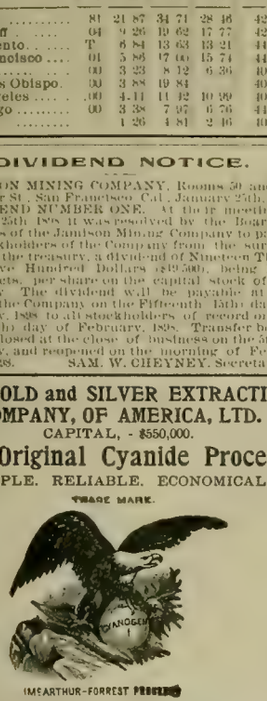
DIVIDEND NUMBER ONE. At the meeting of January 25th 1898 it was resolved by the Board of Directors of the Jamison Mining Company to pay to the Stockholders of the Company from the surplus funds in the treasury, a dividend of Nineteen Thousand Five Hundred Dollars ($19,500), being Five Cents (5 cts.) per share on the capital stock of the Company. The dividend will be payable at the office of the Company on the Fifteenth (15th) day of February, 1898 to all stockholders of record on the Fifth (5th) day of February, 1898. Transfer books will be closed at the close of business on the 5th of February, and reopened on the morning of February 16, 1898. SAM. W. CHEYNEY, Secretary.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.

CAPITAL, - $550,000.

The Original Cyanide Process.

SIMPLE. RELIABLE. ECONOMICAL.



Gold Medal, Columbian Exposition, 1893.

MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by

The MacArthur-Forrest Cyanide Process.

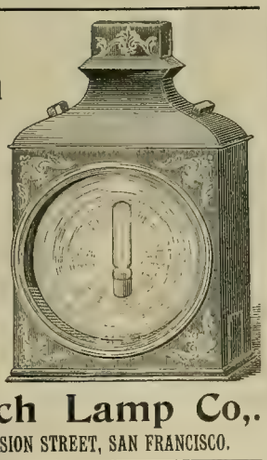
Samples assayed and fully reported upon. Particulars upon application.

Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; J. Stanley Muir, Technical Manager.

California and Nevada Agent, Bertram Hunt, 216 Sansome Street, San Francisco.

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Mining, Mill, Driving and Locomotive Headlights.



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14 "
12 "
10 "
8 "
6 "

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Board and Room per day, $1.00 to $2.00. Board and Room per week, $6.00 to $12.00. Single Rooms, 50 cts, to $1.00. Family Rooms, $1.00 to $1.50.

Free Coach to and from the Hotel.

Assessment Notices.

THE ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, Cal. forma. Location of works, Grass Valley Mining District, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 1st day of February, 1898, an assessment (No. 7) of two cents per share was levied upon the capital stock of the corporation payable immediately in United States gold coin to the secretary, at the office of the company, No. 55 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of March, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. C. THURSTON, Secretary.

Office—No. 55 Mission street, San Francisco, California.

FALL RIVER CONSOLIDATED GOLD QUARTZ Company. Location of principal place of business, San Francisco, California; location of works, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 15th day of January, 1898, an assessment (No. 11) of 2 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 315 315 Front street San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on THURSDAY the 21st day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. LORSBACH, Secretary.

Office—313-315 Front street, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

BALIOL GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1898, an assessment (No. 2) of 30 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of March, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Mills building, room 7, fifth floor, San Francisco, California.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Humboldt County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 29th day of November, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Harvey M. Rinckley	2	1	5 00
Alice E. Binckley	20	4	20 00
Alice E. Binckley	23	20	100 00
Alice E. Binckley	24	20	100 00
Alice E. Binckley	25	20	100 00
Alice E. Binckley	26	20	100 00
Alice E. Binckley	39	1	5 00
Alice E. Binckley	40	2	10 00
Caroline S. Townsend	18	20	100 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the corporation, 125 Beale street, San Francisco, California, on SATURDAY, the 29th day of January, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the day of sale of the above delinquent stock has been postponed to SATURDAY, February 26th, 1898, at the same hour and place. H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 12) levied on the 3rd day of January, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
L. P. Drexler	87	10	90
Leo Alexander, Trustee	85	17,990	1,619 10

And in accordance with law, and an order from the Board of Directors, made on the 3rd day of January, 1898 so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 28th day of February, 1898, at the hour of 2 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale. CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

Lunkenheimer's "Clip" Gate Valve.

Single Disc DOUBLE SEATED. Made with Screw Ends from ¼ in. to 3 in. sizes.



BEST IN QUALITY.
LOWEST IN PRICE.
THE ENGINEERS' FAVORITE.



These Valves are made of cast iron and all wearing parts of gun metal. They are superior to the common cheap, brass valves with which the market is flooded.

WHY?

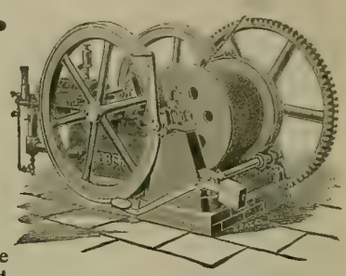
BECAUSE they possess all the advantages of a cast iron pipe fitting Elbow, Tee, Coupling, Union etc namely are heavy and rigid not injured by expansion and contraction or rough handling in pipe fitting. TAKE PRESSURE FROM EITHER END. Body and hub are held together by a steel clip consequently always easily taken apart. Joint between body and hub made permanent by an imbedded seamless oval copper wire washer. If you desire the BEST, STRONGEST and MOST DURABLE valve for general purposes on all ordinary pressures, use this valve. IT IS A STANDARD FITTING, OF NEAT APPEARANCE and FULLY WARRANTED TO SATISFY. Made also in All Iron for Cyanide Plants. Try them and be convinced. Specify them and order through your dealer. Our Catalogue of superior Steam Specialties, FREE for the asking.

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MONEY SAVERS.

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This cut represents our 10, 15, 20, 30, 40, 50 H. P. Geared Hoist.

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Yours truly, A. L. ROOD.

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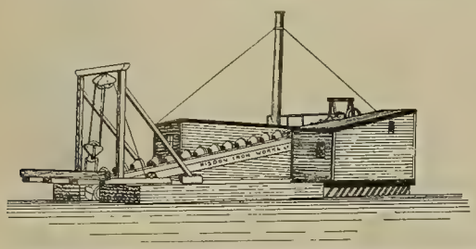
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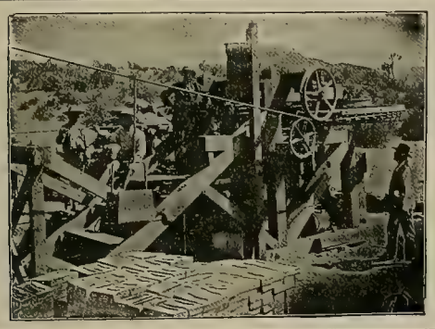
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EVANS PAT. HYDRAULIC ELEVATORS AND HYDRAULIC GIANTS,

Water Wheels and Sheet Iron Riveted Pipe.

Hammered Steel Shoes and Dies for Stamp Mills.

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Established 1860. ✦ ENGINEERS AND MANUFACTURERS OF **Ore Milling and Smelting Equipments.**

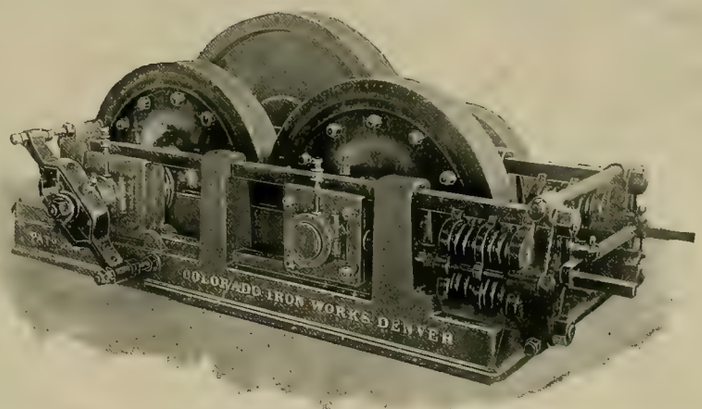
We beg to call attention to our

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as being the most efficient and the most economical machine for fine dry crushing ever placed upon the market. The rolls having

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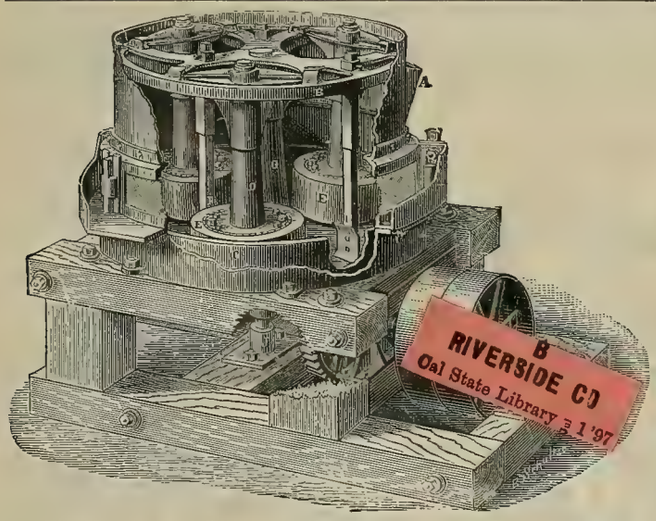
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MINING AND SCIENTIFIC PRESS.
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California Cheap Mining and Milling.

Recently was stated in these columns that quartz ore was mined and milled at the Spanish mine, Nevada Co., this State, for 60 cents per ton, illustrating the new era of mining where close figuring and economy prevail, as compared with the old style of the early days when nothing less than "$20 rock" was looked at. Nothing better illustrates the value of low grade ore and the permanency of the mining industry than authentic figures of actual cost of mining and milling. It is not theory but accomplished facts. Laboratory processes are not infrequent, but the actual tangible work resulting in profit from low grade ore is a species of proof most convincing. Another instance of what intelligent methods and good management can do under favorable conditions in mine production is afforded by the record of the Baliol Mining Co., at Sutter Creek, Amador Co., Cal., of which S. R. Porter is superintendent. Following are exact data of the work and cost of mining and milling gold ore at that property during the month of last April, during which time the mill was closed sixty hours:

COST OF MINING FOR APRIL.

534 days labor mining	$1,145 50
25 days blacksmith, sharpening	60 00
1275 lbs. powder	102 00
5 boxes caps	2 50
2200 feet fuse	11 22
30 days lighting, miners' candles	7 50
310¼ days labor tramming ore	647 12
30 days lighting, trammers' candles	7 50
5 gallons coal oil for lamps	55
Oil for cars	2 83
Total cost of mining and delivering 5885 tons of ore	$1,986 72

COST OF MILLING FOR APRIL.

118½ days labor on batteries and plates	$ 362 00
61½ " " " concentrators	168 00
44 " " " rock crushers	101 25
94 " " " ore bin	188 00
Mill repairs	161 27
Mill expense	60 12
Mill lighting	26 06
Power water supply for April	480 00
Total cost of running mill for April	$1,546 70
Cost of mining and delivering 5885 tons of ore	$1,968 72 or 33¾ cents per ton.
Cost of milling, do	1,546 70 " 26¼ " " "
Cost of mining and milling	$3,533 42 or 60 cents per ton.

It is to be noted that there was no special effort to make any record; the above was an ordinary 27½ days' work. The mill is a 40-stamp one, each stamp weighing 1000 pounds, with a four-inch drop, 102 drops per minute with a nine-inch die. It is also to be noted that forty stamps in 27½ days crushed 5885 tons of ore—an average of 5.35 tons per stamp per twenty-four hours—a high duty. The ore was excavated from an open cut 75x125 feet, from which it was dumped into a chute and trammed 700 feet to another chute, where it was again trammed 800 feet to ore bin at mill, the ore being handled twice and trammed a distance of 1500 feet.

The Saginaw Mines of Arizona.

Developments and improvements have been made during '97 at the Saginaw property, nine miles southwest of Tucson, Arizona. This property consists of twelve claims, encompassing portions of the foothills of the Tucson mountains, about 300 feet higher than the Santa Cruz valley, where the city of Tucson is situated. The location surprises those who are accustomed to mining in rugged formations at great altitudes. The ores of the Saginaw are mainly sulphides of iron and lead, largely oxidized on the surface. The values carried are chiefly gold, silver and lead. Returns range in value from $22 to $48 per ton. The property is being developed and worked from four different shafts, two of which are about 300 feet in depth. They are each sunk following the slight inclination of the vein. From each shaft crosscuts are run at different levels. There appear to be several ledges or veins paralleling each other, but which dip toward a common center, the local conclusion being that they unite at considerable depth. The vein matter opened in each of the four shafts is of the uniform value mentioned above.

The method of treating the ore of the Saginaw is exemplified by the plant of machinery there. It consists of a mill in operation and a smelter in course of construction. The mill consists of a No. 4 Gates crusher, three Huntingtons and six concentrators. The small smelting plant, which joins the mill, is being equipped with one copper and one lead furnace and a blower. The machinery is being run by a 95 H. P. Corliss engine. The property furnishes all the materials necessary for fluxes in the smelting process, including plenty of limestone.

The water supply is conveyed to the property by a pipe line from the Santa Cruz river, four miles distant, pumped into tanks above the mill and smelter, which are capable of storing 40,000 gallons.



SAGINAW MILL AND SMELTER NEAR TUCSON, ARIZONA.

This property, which is being developed and built up with unusual energy, is of considerable promise. It belongs to the Saginaw Mining Company, of which Capt. J. D. Burgess is general manager; Chas E. Thomas is superintendent.

Part of the company's holdings is 240 acres of placer ground, lying in the valley immediately below their lode claims. These claims are said to contain sand and gravel 4 to 8 feet deep, which carry values sufficiently high to warrant being worked with profit.

It has been recently held by a court of appeal that where litigation between rival companies interested in the same mineral deposits is incapable of satisfactory judicial determination a contract entered into between them in good faith, for the purpose of ending such litigation, whereby their rival interests are consolidated, the contract involving the purchase of other mines and plants in different parts of the country, such combination is not illegal, as tending to create a monopoly, the companies exercising no public franchises, but being simply the owners of a species of property which in its natural state is of no use to mankind, and their output comprising but a small proportion of the product of the country.

Regarding the recent ruling of the Interior Department and the General Land Office concerning the amount of work required on each mining claim before patent would issue, and the date when such order goes into effect, Commissioner Hermann states that all claims upon which work was done before December 15th, '97, will be approved. He also states that it will suffice if, in application for patent for a group of claims, work or improvements aggregating in value $500 for each claim can be shown to have been put upon the group as an entirety. Were $750 expended upon one location and $250 on another, jointly owned with the first, both would pass.

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J. F. HALLORAN.....General Manager

San Francisco, February 26, 1898.

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The Golden Jubilee Mining Fair.

The Golden Jubilee Mining Fair, which has been in progress in San Francisco since January 29th, is a financial success. It is believed to be the first exposition in the world's history devoted entirely to a display of mining machinery, ores and supplies, and has been seen by many thousands. The prominence of the mining industry, the 50th anniversary of the discovery of gold in California, and the present Klondike excitement were among the inducements to have such an exhibition in the coast metropolis at this time, and the opportunity has been improved. During this week there have been several drilling and wrestling contents that have attracted unusual attention. During the fair there has been considerable oratory. On University of California Day, Feb. 19, S. B. Christy, of Berkeley, Cal., Professor of Mining and Metallurgy of the University of California, spoke as follows:

Mr. President, Ladies and Gentlemen, Pioneers and Miners of California:—In the name of your University I come to you greeting! And first I bring one more leaf for the laurel crown of our new-world Argonauts. Half a century ago they sought once more the Golden Fleece, their faces all aglow with the bright hopes of youth. The fires of youth burned out, but their courage and their manly strength won for us our birthright, beloved California! California, the land of blue skies and golden sands, of purple grape and vine clad hills, of olive and of orange groves, the land where the sunshine lingers lovingly upon her snow-crowned mountain tops. Through them, this land is ours! Therefore, noble remnant of that gallant band of pioneers, are we come to honor your gray hairs.

And next we recognize in this exposition a fitting landmark in the progress of the mining art. The hydraulic giant has displaced the rocker and the miner's pan, the stamp mill, now grown to lionhood, roars in the ravine, the diamond drill probes where the plummet cannot sound, dynamite rends the mountain, and electricity illumes the miner's footsteps and lightens his labors. In this age knowledge has become power, and at this day, without the aid of science the miner toils in vain. Hence to the California miner and his friends I come, in the name of Science, to pledge the unfailing aid and sympathy of California's University.

The plan of your University was cast by her large-minded founders in a worthy mold. Noble in its proportions, generous in its sympathies, it includes within its limits every deserving phase of human activity. Grounded on the utilities it yet reaches out and embraces the utmost yearnings of the human soul.

Recognizing in agriculture, in mining and the mechanic arts the foundation of all material progress, it aims to provide trained men who shall become leaders in these industries. Remembering the ills that flesh is heir to, the physician and the surgeon are sent to heal the sick or smooth the pillow of the dying. Believing commerce to be the great civilizer, it aims to make this fair city the key to the commerce of the Orient. History points her finger at the rocks on which have foundered empires. Law and civil policy develop and strengthen citizenship. Nor is science for its own sake forgotten. The fly embalmed in amber, the mote that swims the eyeball, the fish that swims the sea, the star that swims the heavens, is each alike the object of its loving scrutiny. And least of all is the higher nature neglected. Art, letters and philosophy all unite to pour into mind and heart the garnered wealth of all the ages—the only wealth that enriches, that beautifies and ennobles life, the faith that cheers and comforts the soul of man, even though his pathway lead him down through the valley of the shadow of death.

This, then, is the plan of the University of California, and I have not read aright the character of our people if they do not cherish this plan in their hearts, and day by day, and year by year, and generation after generation, do not give of their substance so that it may be nobly realized, and the light that was lit on the Berkeley hills may not go out, but burn clear until it shall illumine not only California, but all the world.

Is it not a wonderful mint, where you can send your sons and daughters to be remelted in its refining furnaces, where the base metal and the dross of their natures are burned away, and where, upon the refined gold of their very souls, is stamped with the seal of the University those undying words, "Let there be light"? "Let there be light, and there was light!" Let there be light, and there shall be light in California so long as her University shines out upon the sea—light on the rock-ribbed ocean, light in the cavernous mine, light in the hall of legislation, light in the court of justice, light in the pulpit, light on the path of duty, light and faith and hope and courage in the hearts of our people.

And now in conclusion, in the name of every man and woman who ever entered the halls of your University, I pledge a loyal devotion to the interests of the State in peace or war. Rest assured that your children, in whose hearts burn the words "Let there be light" may be depended upon, each in his own sphere and calling in life, to do his duty by the State, and, if need be, to die in her defense.

On the 22nd Gov. Budd, Mayor Phelan, J. H. Neff and others made speeches. Hon. Jno. F. Davis of Amador county was the orator of the evening and spoke at 8:30 P. M. He said:

Fellow-citizens of San Francisco:—The fiftieth anniversary of any event is its golden jubilee. On the 24th of last month we celebrated by a grand pageant in the streets of this city the golden jubilee of the discovery of gold on the Pacific slope. This magnificent mining fair is, I take it, but a continued celebration of that event; and today, set apart by your committee as "Miners' Day," is reserved for an exclusive mining celebration of the wonderful discovery of gold that ultimately gave to the world a new commonwealth, and to the flag of the Union its thirty first star.

To-day, which, under ordinary circumstances, we would devote exclusively to a celebration of the birthday of the "Father of his Country," to-day, while our eyes are still moist wi h sorrow for the fate of the brave men of the pride of our navy, and while we are yet patiently waiting to know what it means, to-day we celebrate an event that finally gave to our country its most valued and largest territorial acquisition Then, as now, on our Eastern seaboard, the timid for a while seemed to predominate. To them there was nothing west of the Rocky mountains but the Great American desert. But the energetic and the daring, the men who make history, the empire builders of that day, did not shrink at the mere thought of territorial aggrandizement. Every new landed acquisition that America had ever made—despite all the warnings of all the prophets—had proved a national blessing. So we, their descendants, as we celebrate our anniversary to-day, stop for a moment at the beginning of our work, and as we look abroad, to the east and to the west, we live the same feelings that cheered the national colors as they supplanted the Spanish at Monterey, as they supplanted the Bear flag at Sonoma. We feel that America must still yield to the manifest destiny that makes her great. No hostile threat of any foreign power, and no grasping insolence of any domestic trust, shall dispel our hope that the Stars and Stripes will yet float triumphant from Newport News to Pearl Harbor, from Washington to Havana, and from Honolulu to the Golden Gate.

The history of gold has been co-extensive with the history of the human race. In every account of a people we find mention made of gold, not of gold in nature or in place, but of gold in circulation and in the arts, and yet comparatively nothing as to the methods of its extraction One thousand eight hundred and forty-eight years after Christ the great science of practical gold mining and milling, as we know it to-day, was in its infancy. Though in other countries and in the mining of other metals contrivances of great power and ingenuity were already long in use, yet when Marshall first discovered the particles of shining gold in the tailrace of the lumber mill at Coloma on that memorable January day in 1848 human genius had not evolved the California quartz mill, nor human ear heard the thunderous music of its roaring stamps. The very conception of many of the most efficient parts of the one absolutely essential requisite of every producing quartz mine, the California stamp mill—the mill that has gone 'round the world—was still sleeping in the brains of men who are alive to-day. From the long-tom, the rocker, the Mexican arrastra, and the old mill with its wooden mortars, square wooden stems and straight wooden cams, to the modern stamp mill, with its iron mortars and stems, revolving tappets, circular cams, steel shoes, steel mouthed rock breakers, automatic ore feeders and oscillating vanners, all under the control of one's little finger touching an electric button, is to a transition from the crude methods of stone ages to the fulfillment of a wizard's dream Here, as ever, necessity was again the mother of invention, and just as long as there shall be low-grade rock to crush, or rebellious ore to reduce, just so long will human ingenuity invent and perfect new and wonderful processes for the extraction and saving of gold.

But with all this development of the processes of both mining and milling, what development has actually been made in the extent of mining itself? The first few years after the rush of '49 saw the working out of the richest and most accessible placers and crevice deposits throughout the State, and millions upon millions of gold was the result. The deep channels of the ancient rivers and the vast deposits which would only yield to the hydraulic process were next attacked, and were yielding an annual output of over ten millions of dollars alone, when hydraulic mining was suppressed by the heavy hand of the law. Mines of inestimable value and machinery worth millions of dollars were by a stroke of the pen rendered valueless. The finding of fact had been made in courts of law that the debris from the hydraulic mines was filling up the beds of the American, Feather, Sacramento and San Joaquin rivers, and the farmers of the valley complained that their lands were being ruined. Acting upon the legal principle that one must so use his own as not to injure his neighbor, the courts suppressed hydraulic mining throughout the State wherever the resultant debris flowed into these rivers, which practically meant suppressing it everywhere except in the Klamath river basin. In vain did the miner contend that the Government, having sold him his land and taken his money for it, was bound to make good an "implied guarantee" that the land could be used by the purchaser for the purpose for which it had been sold. The courts decided against him. Congress recognized no such claim, and maintained that any relief upon that ground would be class legislation. The miner found himself continually running against the steel wall that he had bought his land with his eyes wide open, and with a full knowledge that the inseparable condition of all ownership of property and of all liberty is the higher law that it must be so used as not to injure your neighbor.

For years all hope of the revival of hydraulic mining in any form was lost, until the miner coming to recognize the farmer's rights, sought his co-operation, and the new movement for the rehabilitation of hydraulic mining, under the leadership of one whom we honor to-day, the Hon. Jacob H. Neff, crystallized into the California Miners' Association. What has been accomplished since the birth of that association is well known to you all. Legislative genius discovered a principle through which Congress could be reached—a plan which in theory, no matter how comprehensive its method, is but an extension of the principle at the bottom of every River and Harbor bill. Not only has the principle for which we have struggled been established, but the Legislature of California and the Congress of the United States have each made an appropriation of $250,000 toward carrying it out, and Nevada City and Marysville, with equal self-interest, are to-day anxiously demanding to know why the work contemplated by the appropriations has not yet been begun.

With the suppression of hydraulic mining the output of California has been, south of the Klamath, confined to her drift mines and her quartz mines. Though during later years these mines have been the exclusive source of our gold production, and though in the last fifty years the gold production of this State has reached the enormous sum of $1,300,000,000, quartz mining in California is but begun It seems to me the California quartz miner has been the prodigal of the earth. Our men, our methods and our machinery have helped to open the quartz mines of all the world except those at home The Comstock, Colorado, Victoria, New South Wales, South Africa, Alaska, Venezuela—all have felt the influence of our capital and our genius, until of late years California has again begun to occupy our attention. The one great blow to legitimate gold mining in California, the one murderous thrust from which it is only now recovering, was the shameless exploiting of the Comstock lode of the State of Nevada upon the San Francisco market. So violent was the craze, so colossal the swindle, and so dependent on mere manipulation did the prices of shares become, that when the inevitable collapse came, all mining went under the ban, and was looked upon as stock gambling. No mining property in this State, however meritorious, could command the necessary money for its development. The result has been that the gold mining industry in this State has, until the last three or four years, lagged, and now that its revival is assured, we find that the great mineral veins of the Mother Lode have scarcely been touched. While the Keys one, the Idaho, the old Eureka, the Utica, the Plymouth Consolidated and the Kennedy have yielded between $5,000,000 and $12,000,000 each, still there has been no deep mining in California to speak of While the shaft at the Union Consolidated mine, in the State of Nevada, was sunk to a depth of 3350 feet fifteen years ago, I have the authority of Ross Browne for saying that there are but between twenty and thirty mines below 1000 feet, and but two below 2000 feet in California to-day. With the magnificent returns attained wherever legitimate quartz mining has been attempted in this State, and with the great mining belt of the Sierras waiting to be opened and developed, with the course of its great lodes specifically ascertained and its geology definitely known, with the uncertainty usually incident to mining in great measure eliminated, with wood at $4 a cord, with water at from 10 to 20 cents a miner's inch, with electric power passing by our front doors, with every appliance of the latest machinery at the call of our telephone, and with a climate which permits us to work in the open air all the year round, we are not tempted by the frozen horrors of all the Klondikes of all the world.

But on an occasion like this we turn from the living present to a kindly remembrance of the days gone by. Many of you have them over again as you look at the sights of this Mining Fair, the days of '49 and the Pioneers. The journey of the ox-team across a continent, the famine and thirst and horror of the desert, the apprehensive fear of the Indian, the struggle through the defiles of the Sierras, the life and luck of the mining camp, the longing for the loved ones you left behind, the night when you lay awake wondering what you would do with the result of your strike, the next day when you found yourself dead-broke, the almost womanly attachment you formed for your partner, the friendships that remained steadfast when all else was gone, the struggle to save the State to the cause of freedom—these are a few of your memories of the days when human nature was put on trial, and when in the end all the gold of its latent nobility came forth, sublimated from all the dross. The memory of the Pioneers will never pass; the traditions of Sutter's Fort, and Coloma, and Table Mountain and Poker Flat will live forever. The very odor of the balsam of the pines, the scent of wild azaleas, the gleam of banks of red sandstone, live in the pages of our history, while the eloquence of Starr King and Baker will survive as long as upon the broad domain of California the heart of a patriot will beat with love.

You of San Francisco owe a debt of gratitude to the Pioneers, which was recognized by the grand celebration of a month ago, and is even still more fittingly recognized by this mineral display. Your splendid municipality is part of the building of their hands. Here upon her seven hills San Francisco sits enthroned, the guardian of the commerce of the Orient. In no other metropolis of the world can fountains play and flowers bloom in the streets all the year round. No other metropolis is flanked on one side by a harbor in which all the navies of all the nations could ride at anchor, and on the other by a park that reaches down to where the waves of the ocean lave its feet. Here shall we find revived the old feeling for the municipality which the Athenian felt for his Acropolis, which the Roman felt for his Forum, which the Parisian still feels for his boulevard. The same contempt for obstacles which characterized the pioneer will fire your true San Franciscan, till grand avenues will cross and surround your city, till oaks and elms and lindens and acacias will line your drives and thoroughfares, till birds will sing in their branches, and fountains play in their shade—till the spirit of public improvement will so imbue every citizen that he will come to feel a proprietary interest in every petal of every flower in your park, in every pebble on your beach and every white-cap on your bay. We of the mountains and the mines wish you and yours every good fortune, and in return for what you have done for us, in return for all that you are at present doing for our every legitimate effort, we desire by the development of the mineral resources of California to do all in our power to build up and improve and beautify your grand metropolis, until its fame shall be such that every traveler on this earth shall come to visit it before he dies.

My friends, gold is the theme of the day we celebrate. But he ill interprets the thought and the ideals of our people who imagines that in this State, or on this day, or in our heart of hearts, we do not know that the claim of California to the gratitude of the nation can never rest alone on the fact of the material discovery of fifty years ago, or the material production of the years that have followed. This is indeed the Golden State, but—beyond all our golden one billion three hundred million dollars of the royal metal; beyond our golden grain, our golden oranges, our golden poppies, our golden sunshine and our golden wine—the history of our pioneer fathers and mothers, their struggles and triumphs in frontier life and mining camp, contains a promise that here, in the veins of this mighty commonwealth, in the life and soul of this great people, are other treasures, the outcroppings of which we discern to-day: the gold of an upright, downright, lightning-defying, intellectual honesty; the gold of a sincere and reverential spirituality; the gold of a frank, brave, strong and tender manhood; the gold of an intelligent, loving, loyal, pure and plucky womanhood. These are the treasures which California will lay at the feet of the nation; these are the virtues which are the lineal descendants of the courage and the heroism and high endeavor of the gulches and the mines, of those immortal scenes and incidents of the days of '49 that are to be the burden and the theme of the "unsung Iliad" of the Sierras and the pines.

The 22nd, Washington's Birthday, was Miners' Day at the Fair. Cornish wrestling and rock drilling were among the contests. Four-ton blocks of Folsom granite were to be drilled. The aggregate of cash prizes was about $1000; in addition, Mayor Phelan gave a handsome gold medal and the Palace Hotel gave a gold medal. The MINING AND SCIENTIFIC PRESS also gave a championship gold medal.

The rules for the contests, which were published in last week's issue, were strictly observed. The contest of three-handed teams, fifteen minutes continuous work, each team allowed sixteen drills, was won by Page, Kitto and Dingle of the Gerrymander mine, Tuolumne Co., 41⅛ inches; the brothers Feeney and Larkin of the Omaha mine, Nevada Co., second, 36¾ inches. The following day P. and J. Feeney of the Omaha mine, Nevada Co., won the two-handed contest, 26⅞ inches, Kitto and Page of the Gerrymander mine, Tuolumne Co., second, 26 9-16 inches. On the 24th inst., in the single-hand contest, J. J. Coan of Nevada City won first prize, 18 inches; T. L. Coffey, Nevada City, second, 17 3-16 inches. Subsequently, in a record-breaking, triple-handed drilling, Page, Kitto and Dingle drilled a hole through 43 11-16 inches hard-grain California granite in fifteen minutes, breaking the former world's record of 42 inches. The banner for the best general mineral exhibit was awarded to Tuolumne Co. The Fair will continue through next week, closing March 5th.

Some inquiry has been made as to previous contests of this nature. The first similar rock-drilling contest on the Pacific coast was held at the Midwinter Fair in San Francisco May 21st, 1894. At the Denver contest the previous year the world's best record was made by D. L. Jones, who single-handed sank a hole 18 11-16 inches deep in fifteen minutes. Page and Riggin of Butte, Montana, drilled a hole 29 15-16 inches in that time. Hearn and Rinker of Denver beat that time in '93, but not officially, they having drilled a hole 31¾ inches in fifteen minutes. At the Midwinter Fair contest E. F. Durham of Grass Valley took the first prize and the world's championship, drilling a hole 19 31-32 inches single-handed in fifteen minutes through Rocklin granite. T. J. Ahearn of Grass Valley, Cal., drilled 19 9-16 inches and took second prize. Both he and Durham broke all former records. In the double-team contest on that day Kitto and Harvey of Amador county, Cal., put a hole down 30 21-32 inches, winning first prize. Feeney and Lynch of Grass Valley drilled 27 5-32 inches, taking second prize. In the three-handed contest Dingle, Kitto and Harvey of Amador county put a hole clear through the 40 inches of Rocklin granite and had about 2 inches in on a second hole when their fifteen minutes was up, they winning first prize. The Feeney brothers and Lynch of Grass Valley, Cal., drilled almost through the 40 inches of granite in the quarter of an hour, taking second prize. In the contests of '94 and of this week the single-handed drillers used ⅝-steel and 4-pound hammers; double and triple teams, ⅞-steel and 8-pound hammers.

THERE is good prospect of the much delayed mineral land bill getting through Congress this session. According to recent Washington advices, Speaker Reed has experienced a change of heart, and has given assurances to California Congressmen that he is in favor of the bill. He had feared that if the bill should pass the House and get to the Senate it would come back with a number of amendments, and prove so cumbersome that it would have to be kept in conference a long time. When assured that there was a perfect understanding on this question he was more ready to listen to arguments. With one exception, the Senators who tried before to kill it by riders and amendments have been relegated to private life.

It appears from this report, made by the Commissioner of the General Land Office to the House Committee on the Public Lands, that that under the so-called "Idaho-Montana" act providing for the examination of lands lying within the railroad grants of those States, that during the years 1895–6–7 6,878,670 acres were classified in Montana by the commission created under that act, of which 3,206,270 acres were found to be mineral lands, and in Idoho 877,733 acres were examined by it and 275,640 acres were classed as mineral lands, leaving an estimated area for classification in Montana of 9,933,814 acres and in Idaho of 1,599,067 acres.

This report states that the total of the lands within the granted and indemnity limits in California which would be affected by the so-called Mineral Land bill (H. R. 3655) now pending in Congress, on favorable report of the House Committee on Public Lands, aggregates 13,679,602.29 acres.

If the ratio shown in Montana and Idaho by the classification of railroad lands therein is preserved in this State the enactment of the California Mineral Land bill would result in saving at least 6,000,000 acres of land to the miner and the prospector, which is about the amount already improperly patented to the various land-grant-aided railroad companies in this State.

United States Mining Laws, and Regulations Thereunder, Relative to the Reservation, Exploration, Location, Possession, Purchase and Patenting of the Mineral Lands in the Public Domain.

NUMBER II.

18. Upon the failure of any one of several co-owners of a vein, lode, or ledge, which has not been entered, to contribute his proportion of the expenditures necessary to hold the claim or claims so held in ownership in common, the co-owners, who have performed the labor or made the improvements as required by said Revised Statutes, may, at the expiration of the year, give such delinquent co owner personal notice in writing, or notice by publication in the newspaper published nearest the claim for at least once a week for ninety days; and if upon the expiration of ninety days after such notice in writing, or upon the expiration of one hundred and eighty days after the first newspaper publication of notice, the delinquent co-owner shall have failed to contribute his proportion to meet such expenditures or improvements, his interest in the claim by law passes to his co-owners who have made the expenditures or improvements as aforesaid. Where a claimant alleges ownership of a forfeited interest under the foregoing provision, the sworn statement of the publisher as to the facts of publication, giving dates and a printed copy of the notice published, should be furnished, and the claimant must swear that the delinquent co-owner failed to contribute his proper proportion within the period fixed by the statute.

TUNNELS.

SEC. 2323, R. S. Where a tunnel is run for the development of a vein or lode, or for the discovery of mines, the owners of such tunnel shall have the right of possession of all veins or lodes within three thousand feet from the face of such tunnel on the line thereof, not previously known to exist discovered in such tunnel, to the same extent as if discovered from the surface; and locations on the line of such tunnel of veins or lodes not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid; but failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins on the line of such tunnel.

19. The effect of this is simply to give the proprietors of a mining tunnel run in good faith the possessory right to fifteen hundred feet of any blind lodes cut, discovered, or intersected by such tunnel, which were not previously known to exist, within three thousand feet from the face or point of commencement of such tunnel, and to prohibit other parties, after the commencement of the tunnel, from prospecting for and making locations of lodes on the *line thereof* and within said distance of three thousand feet, unless such lodes appear upon the surface or were previously known to exist.

20. The term "face," as used in said section, is construed and held to mean the first working face formed in the tunnel, and to signify the point at which the tunnel actually enters cover; it being from this point that the three thousand feet are to be counted upon which prospecting is prohibited as aforesaid.

21. To avail themselves of the benefits of this provision of law, the proprietors of a mining tunnel will be required, at the time they enter cover as aforesaid, to give proper notice of their tunnel location by erecting a substantial post, board, or monument at the face or point of commencement thereof, upon which should be posted a good and sufficient notice, giving the names of the parties or company claiming the tunnel right; the actual or proposed course or direction of the tunnel; the height and width thereof, and the course and distance from such face or point of commencement to some permanent well-known objects in the vicinity by which to fix and determine the *locus* in manner heretofore set forth applicable to locations of veins or lodes, and at the time of posting such notice they shall, in order that miners or prospectors may be enabled to determine whether or not they are within the lines of the tunnel, establish the boundary lines thereof, by stakes or monuments placed along such lines at proper intervals, to the terminus of the three thousand feet from the face or point of commencement of the tunnel, and the lines so marked will define and govern as to the specific boundaries within which prospecting for lodes not previously known to exist is prohibited while work on the tunnel is being prosecuted with reasonable diligence.

22. At the time of posting notice and marking out the lines of the tunnel as aforesaid, a full and correct copy of such notice of location defining the tunnel claim must be filed for record with the mining recorder of the district, to which notice must be attached the sworn statement or declaration of the owners, claimants, or projectors of such tunnel, setting forth the facts in the case; stating the amount expended by themselves and their predecessors in interest in prosecuting work thereon; the extent of the work performed, and that it is *bona fide* their intention to prosecute work on the tunnel so located and described with reasonable diligence for the development of a vein or lode, or for the discovery of mines, or both, as the case may be. This notice of location must be duly recorded, and, with the said sworn statement attached, kept on the recorder's files for future reference.

23. By a compliance with the foregoing much needless difficulty will be avoided, and the way for the adjustment of legal rights acquired in virtue of said section 2323 will be made much more easy and certain.

24. This office will take particular care that no improper advantage is taken of this provision of law by parties making or professing to make tunnel locations, ostensibly for the purposes named in the statute, but really for the purpose of monopolizing the lands lying in front of their tunnels to the detriment of the mining interests and to the exclusion of *bona fide* prospectors or miners, but will hold such tunnel claimants to a strict compliance with the terms of the statutes; and a *reasonable diligence* on their part in prosecuting the work is one of the essential conditions of their implied contract. Negligence or want of due diligence will be construed as working a forfeiture of their right to all undiscovered veins on the line of such tunnel.

SEC. 2329, R. S. Claims usually called "placers," including all forms of deposit, excepting veins of quartz, or other rock in place, shall be subject to entry and patent, under like circumstances and conditions, and upon similar proceedings, as are provided for vein or lode claims; but where the lands have been previously surveyed by the United States, the entry in its exterior limits shall conform to the legal subdivisions of the public lands.

SEC. 2330. Legal subdivisions of forty acres may be subdivided into ten-acre tracts; and two or more persons, or associations of persons, having contiguous claims of any size, although such claims may be less than ten acres each, may make joint entry thereof; but no location of a placer claim, made after the ninth day of July, eighteen hundred and seventy, shall exceed one hundred and sixty acres for any one person or association of persons, which location shall conform to the United States surveys; and nothing in this section contained shall defeat or impair any *bona fide* pre-emption or homestead claim upon agricultural lands, or authorize the sale of the improvements of any *bona fide* settler to any purchaser.

SEC. 2331. Where placer claims are upon surveyed lands, and conform to legal subdivisions, no further survey or plat shall be required, and all placer-mining claims located after the tenth day of May, eighteen hundred and seventy-two, shall conform as near as practicable with the United States system of public-land surveys, and the rectangular subdivisions of such surveys, and no such location shall include more than twenty acres for each individual claimant; but where placer claims cannot be conformed to legal subdivisions, survey and plat shall be made as on unsurveyed lands; and where by the segregation of mineral lands in any legal subdivision a quantity of agricultural land less than forty acres remains, such fractional portion of agricultural land may be entered by any party qualified by law, for homestead or pre-emption purposes.

25. But one discovery of mineral is required to support a placer location, whether it be of twenty acres by an individual, or of one hundred and sixty acres or less by an association of persons.

BUILDING STONE.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person authorized to enter lands under the mining laws of the United States may enter lands that are chiefly valuable for building stone under the provisions of the law in relation to placer-mineral claims; *Provided*, That lands reserved for the benefit of the public schools or donated to any State shall not be subject to entry under this act.

26. This act extends the mineral-land laws so as to bring lands chiefly valuable for building stone within the provisions of said law by authorizing a placer entry of such lands. It does not operate, however, to withdraw lands chiefly valuable for building stone from entry under any existing law applicable thereto. Registers and receivers should, therefore, make a reference to said act on the entry papers in the case of all placer entries made for lands containing stone chiefly valuable for building purposes. It will be noted that lands reserved for the benefit of public schools or donated to any State are not subject to entry under said act.

PETROLEUM AND OTHER MINERAL OILS.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person authorized to enter lands under the mining laws of the United States may enter and obtain patent to lands containing petroleum or other mineral oils, and chiefly valuable therefor, under the provisions of the laws relating to placer mineral claims; *Provided*, That lands containing such petroleum or other mineral oils which have heretofore been filed upon, claimed, or improved as mineral, but not yet patented, may be held and patented under the provisions of this act the same as if such filing, claim, or improvement were subsequent to the date of the passage hereof.

27. It is to be observed that the provisions of the mineral laws relating to placers are by said act extended so as to allow the location and entry thereunder of public lands chefly valuable for petroleum or other mineral oils, and entries of that nature made prior to the passage of said act are to be considered as though made thereunder.

28. By section 2330 authority is given for the subdivision of forty-acre legal subdivisions into *ten-acre* lots, which is intended for the greater convenience of miners in segregating their claims both from one another and from intervening agricultural lands.

29 It is held, therefore, that under a proper construction of the law these ten-acre lots in mining districts should be considered and dealt with, to all intents and purposes, as legal subdivisions, and that an applicant having a legal claim which conforms to one or more of the ten-acre lots, either adjoining or cornering, may make entry thereof, after the usual proceedings, without further survey or plat.

30. In cases of this kind, however, the notice given of the application must be very specific and accurate in description, and as the forty-acre tracts may be subdivided into ten-acre lots, either in the form of squares of ten by ten chains, or, if parallelograms, five by twenty chains, so long as the lines are parallel and at right angles with the lines of the public surveys, it will be necessary that the notice and application state specifically what ten-acre lots are sought to be patented in addition to the other *data* required in the notice.

31. Where the ten-acre subdivision is in the form of a square it may be described, for instance, as the "SE.¼ of the SW.¼ of the NW.¼," or, if in the form of a parallelogram as aforesaid, it may be described as the "W.½ of the W.½ of the SW.¼ of the NW.¼ (or the N.½ of the S.½ of the NE ¼ of the SE.¼) of section ——, township ——, range ——," as the case may be; but, in addition to this description of the land, the notice must give all the other *data* that is required in a mineral application, by which parties may be put on inquiry as to the premises sought to be patented. The proofs submitted with applications for claims of this kind must show clearly the character and the extent of the improvements upon the premises.

The proof of improvements must show their value to be not less than *five hundred dollars*, and that they were made by the applicant for patent or his grantors. The annual expenditure to the amount of $100, required by section 2324, Revised Statutes, must be made upon placer claims as well as lode claims.

32. Applicants for patent to a placer claim, who are also in possession of a known vein or lode included therein, must state in their application that the placer includes such vein or lode. The published and posted notices must also include such statement. If veins or lodes lying within a placer location are owned by other parties, the fact should be distinctly stated in the application for patent, and in all the notices. But in all cases, whether the lode is claimed or excluded, it must be surveyed and marked upon the plat; the field notes and plat giving the area of the lode claim or claims and the area of the placer separately. It should be remembered that an application which omits to include an application for a known vein or lode therein must be construed as a conclusive declaration that the applicant has no right of possession to the vein or lode. Where there is no known lode or vein, the fact must appear by the affidavit of two or more witnesses.

33. By section 2330 it is declared that no location of a placer claim, made after July 9, 1870, shall exceed one hundred and sixty acres for any one person or association of persons, which location shall conform to the United States surveys.

34. Section 2331 provides that all placer-mining claims located after May 10, 1872, shall conform as nearly as practicable with the United States systems of public surveys and the subdivisions of such surveys, and no such locations shall include more than twenty acres for each individual claimant.

35. The foregoing provisions of law are construed to mean that after the 9th day of July, 1870, no location of a placer claim can be made to exceed one hundred and sixty acres, whatever may be the number of locators associated together, or whatever the local regulations of the district may allow; and that from and after May 10, 1872, no location can exceed twenty acres for each individual participating therein; that is, a location by two persons cannot exceed forty acres, and one by three persons cannot exceed sixty acres.

36. The regulations hereinbefore given as to the manner of marking locations on the ground, and placing the same on record, must be observed in the case of placer locations so far as the same are applicable, the law requiring, however, that where placer claims are upon *surveyed* public lands the locations must hereafter be made to conform to legal subdivisions thereof as near as practicable.

PROCEDURE TO OBTAIN PATENT TO MINERAL LANDS.

SEC. 2325, R. S. A patent for any land claimed and located for valuable deposits may be obtained in the following manner: Any person, association, or corporation authorized to locate a claim under this chapter, having claimed and located a piece of land for such purposes, who has, or have, complied with the terms of this chapter, may file in the proper land office an application for a patent, under oath, showing such compliance, together with a plat and field notes of the claim or claims in common, made by or under the direction of the United States surveyor-general, showing accurately the boundaries of the claim or claims, which shall be distinctly marked by monuments on the ground, and shall post a copy of such plat, together with a notice of such application for a patent, in a conspicuous place on the land embraced in such plat previous to the filing of the application for a patent, and shall file an affidavit of at least two persons that such notice has been duly posted, and shall file a copy of the notice in such land office, and shall thereupon be entitled to a patent for the land, in the manner following: The register of the land office, upon the filing of such application, plat, field notes, notices, and affidavits, shall publish a notice that such application has been made, for the period of sixty days, in a newspaper to be by him designated as published nearest to such claim; and he shall also post such notice in his office for the same period. The claimant at the time of filing this application, or at any time thereafter, within the sixty days of publication, shall file with the register a certificate of the United States surveyor-general that five hundred dollars' worth of labor has been expended or improvements made upon the claim by himself or grantors; that the plat is correct, with such further description by such reference to natural objects or permanent monuments as shall identify the claim, and furnish an accurate description, to be incorporated in the patent. At the expiration of the sixty days of publication the claimant shall file his affidavit, showing that the plat and notice have been posted in a conspicuous place on the claim during such period of publication. If no adverse claim shall have been filed with the register and the receiver of the proper land office at the expiration of the sixty days of publication, it shall be assumed that the applicant is entitled to a patent, upon the payment to the proper officer of five dollars per acre, and that no adverse claim exists; and thereafter no objection from third parties to the issuance of a patent shall be heard, except it be shown that the applicant has failed to comply with the terms of this chapter.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section twenty-three hundred and twenty-five of the Revised Statutes of the United States be amended by adding thereto the following words: "*Provided*, That where the claimant for a patent is not a resident of or within the land district wherein the vein, lode, ledge, or deposit sought to be patented is located, the application for patent and the affidavits required to be made in this section by the claimant for such patent may be made by his, her, or its authorized agent, where said agent is conversant with the facts sought to be established by said affidavits: *And provided*, That this section shall apply to all applications now pending for patents to mineral lands."

SEC. 2328. Applications for patents for mining claims under former laws now pending may be prosecuted to a final decision in the General Land Office; but in such cases where adverse rights are not affected thereby, patents may issue in pursuance of the provisions of this chapter; and all patents for mining claims upon veins or lodes heretofore issued shall convey all the rights and privileges conferred by this chapter where no adverse rights existed on the tenth day of May, eighteen hundred and seventy-two.

37. As a condition for the making of application for patent according to section 2325, there must be a preliminary showing of work or expenditure upon each location, either by showing the full amount sufficient to the maintenance of possession under section 2324 for the pending year, or, if there has been failure, it should be shown that work has been resumed so as to prevent relocation by adverse parties after abandonment.

The "pending year" means the calendar year in which application is made, and has no reference to a showing of work at the date of the final entry.

38. This preliminary showing may, where the matter is unquestioned, consist of the affidavit of two or more witnesses familiar with the facts.

LODE CLAIM.

39. The claimant is required, in the first place, to have a correct survey of his claim made under authority of the surveyor-general of the State or Territory in which the claim lies, such survey to show with accuracy the exterior surface boundaries of the claim, which boundaries are required to be distinctly marked by monuments on the ground. Four plats and one copy of the original field notes in each case will be prepared by the surveyor-general; one plat and the original field notes to be retained in the office of the surveyor-general, one copy of the plat to be given the claimant for posting upon the claim, one plat and a copy of the field notes to be given to the claimant for filing with the proper register, to be finally transmitted by that officer, with other papers in the case, to this office, and one plat to be sent by the surveyor-general to the register of the proper land district, to be retained on his files for future reference. As there is no resident surveyor-general for the State of Arkansas, applications for the survey of mineral claims in said State should be made to the Commissioner of this office, who, under the law, is *ex officio* the U. S. surveyor-general.

40. The survey and plat of mineral claims required to be filed in the proper land office with application for patent must be made subsequent to the recording of the location of the mine; and when the original location is made by survey of a United States deputy surveyor, such location survey cannot be substituted for that required by the statute, as above indicated.

DIRECTIONS FOR PREPARING PLAT.

41. The surveyors-general should designate all surveyed mineral claims by a progressive series of numbers, beginning with survey No. 37, irrespective as to whether they are situated on surveyed or unsurveyed lands, the claim to be so designated at date of issuing the order therefor, in addition to the local designation of the claim; it being required in all cases that the plat and field notes of the survey of a claim must, in addition to the reference to permanent objects in the neighborhood, describe the *locus* of the claim, with reference to the lines of public surveys, by a line connecting a corner of the claim with the nearest public corner of the United States surveys, unless such claim be on unsurveyed lands at a distance of more than two miles from such public corner, in which latter case it should be connected with a United States mineral monument. Such connecting line must not be more than *two miles* in length and should be measured on the ground direct between the points, or calculated from actually surveyed traverse lines if the nature of the country should not permit direct measurement. If a regularly established survey corner is within two miles of a claim situated on unsurveyed lands, the connection should be made with such corner in preference to a connection with a United States mineral monument. The connecting line must be surveyed by the deputy mineral surveyor at the time of his making the particular survey and be made a part thereof.

42. Upon the approval of the survey of a mining claim made upon surveyed lands the surveyor-general will prepare and transmit to the local land office and to this office a diagram tracing showing the portions of legal 40-acre subdivisions made fractional by reason of the mineral survey, designating each of such portions by the proper lot number, beginning with No. 1 in each section, and giving the area of each lot.

43. The following particulars should be observed in the survey of every mining claim:

(1) The exterior boundaries of the claim should be represented on the plat of survey and in the field notes.

(2) The intersection of the lines of the survey with the lines of conflicting prior surveys should be noted in the field notes and represented upon the plat.

(3) Conflicts with unsurveyed claims, where the applicant for survey does not claim the area in conflict, should be shown by actual survey.

(4) The total area of the claim embraced by the exterior boundaries should be stated, and also the area in conflict with each intersecting survey, substantially as follows:

	Acres.
Total area of claim	10.50
Area in conflict with survey No. 302	1.56
Area in conflict with survey No. 948	2.33
Area in conflict with Mountain Maid lode mining claim, unsurveyed	1.48

It does not follow that because mining surveys are required to exhibit all conflicts with prior surveys the areas of conflict are to be excluded. The field notes and plat are made a part of the application for patent, and care should be taken that the description does not inadvertently exclude portions intended to be retained. It is better that the application for patent should state the portions to be excluded in express terms.

(To be Continued.)

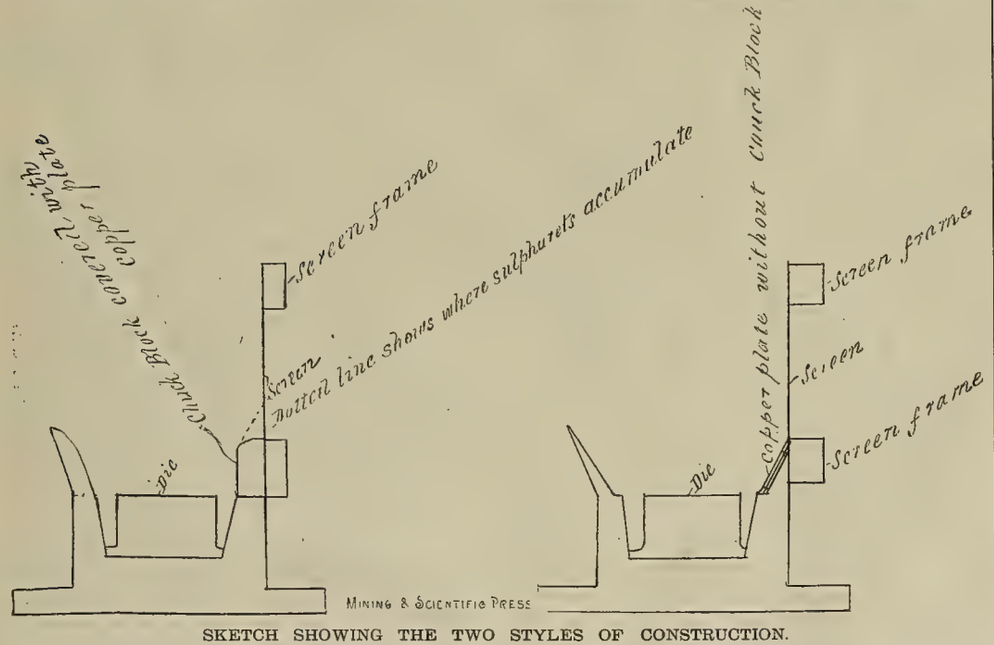
Proposed Changes in Stamp Mill Practice.

Frequent suggestions are received by this paper as to changes and proposed improvements in stamps, some of which seem of sufficient importance to justify notice. Under date of February 8th, Mr. W. Sharwood writes from Soulsbyville, Tuolumne Co., Cal., saying:

"In the article by E. H. Johnson on stamp milling, on page 160 of your last issue, I read with much interest his remarks on the chuck block, as used in almost all mortars made in this State."

Mr. Sharwood, in criticising the construction of one style of stamp mill, thinks that where the block in the mortar so nearly approaches the vertical it "prevents the pulp from being driven in a direct line from the top of the die to the lower edge of screen. With this obstruction nothing passes out of the lower 2 or 3 inches of screen but by flotation, the rounded top of the chuck block forming a complete barrier to the lower edge of screen, and at the same time making a ledge on which the sulphurets accumulate and pile against the screen until they are high enough to be moved by the wash, which is in a direct line from the top of die over the rounded edge of chuck block to wherever that line may strike the screen. I saw this mistake in construction more than twenty years ago, and when having some mortars made for the Keltz mine, I had a pattern made at the Sonora foundry which dispenses with the chuck block, the copper plate being riveted to a stout sheet-iron backing and set at an angle of 60° from the horizontal, being held in position by wooden wedges driven against lugs, which are cast for the purpose, at each end of the mortar, these wedges being easily pried out when the plates are taken out at cleaning-up time. The plates spring from a ledge cast in the mortars at a level with the top of the dies, and, being made with a feather edge, impinge against the screen frames exactly at the bottom of screens, the pulp thus having a freer discharge and a far less quantity of slimes being made. When the dies are about one-half worn down I take them out and put them in a battery which has a false bottom about 2½ inches thick; this keeps them up to level without the necessity of altering a chuck block. These mortars are in use in several mills in this county and have always given satisfaction, as the plates amalgamate better without scouring and a larger quantity can be crushed because of the freer discharge. I enclose a sketch on a 2-inch scale of the two styles."

The sketch has been engraved and appears herewith.

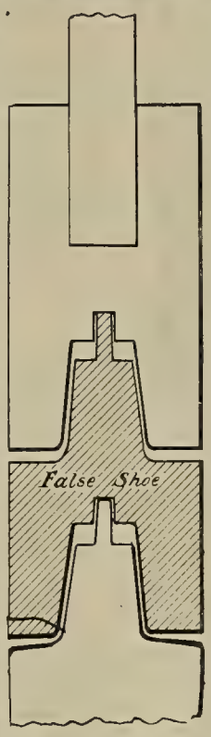


SKETCH SHOWING THE TWO STYLES OF CONSTRUCTION.

Recently was noticed herein a matter of interest in this connection which was suggested by Capt. Richard A. Parker, consulting engineer of the California Exploration Co. In this case the proposed improvement consisted of a false shoe to be inserted in the boss as the crushing shoe wears down, and which is designed to keep the stamp to its normal weight. It is made like the ordinary shoe, with a recess in its bottom the same as the recess in the boss. This, it is claimed, if inserted as the shoe wears down, will maintain the uniformity of the weight of the stamp and consequently maintain the uniformity of crushing, besides allowing an additional amount of wear from the worn shoe. This, however, introduces another feature and requires that the mortar boxes be high enough to permit the insertion of the false shoes, provision to be made for this.

While in South Africa in charge of some large properties, Capt. Parker made practical tests of these false shoes in mills erected there, with satisfactory results.

The illustration of the device is reproduced. On this matter, Capt. Parker, at the time said:



"Stamp milling on the Rand must be regarded in a different light from that of other places or other countries; there it is essentially a crushing machine and its usefulness is dependent upon its ability to pulverize the ore fine enough to liberate the gold and prepare the ore for chemical treatment. Elsewhere the primary object is to amalgamate the ore in the mortar; but the two objects are in a measure opposed to each other. The usual weight of the stamp is 950 to 1050 pounds, and as high as five and a quarter tons per day of blue ore is crushed by the latter weight stamp. To increase the weight of the stamp necessitates an increased area of wearing parts. A 9-inch die used with a 1050-pound stamp has $63\frac{5}{10}$ square inches of wearing surface. If the weight of the stamp is increased this wearing area should be increased, and the proportionate area for a 1250-pound stamp is 84 square inches, which corresponds to $10\frac{3}{8}$ inches in diameter for the die.

"One thing that is notable in South Africa is the fact that the shoes are made much deeper there than here, in order that a smaller proportion of metal may be thrown away when the shoe is worn out. The advantage of using a false shoe, therefore, becomes much more important in cases where deep shoes are used. All over California there has been an increase of late in the depth of shoes. Mill men are beginning to realize the fact that stamps should be heavier than those used ten years ago.

"So far as my knowledge goes, the ultimate end of all our milling work is going to be confined very largely to the question of crushing. It certainly was so in South Africa, and I see no critical difference between what would constitute good practice there and here. Stamps weighing on an average 800 pounds in South Africa have been replaced by those weighing 1000 pounds, and in many cases up to 1250 pounds.

"Of course, the question of crushing is a function of the mortar and stamp and shoe and die; and in the mortar of late years the tendency has been to reduce its size so as to keep the pulp upon the dies. In Colorado there are extreme cases where it has been found necessary to amalgamate as far as possible in the mortars, and there are in use 600-pound stamps which drop 16 inches thirty times a minute. The crushing capacity of such a plant is necessarily limited; and as you pass through the various stages of heavier stamps with an increasing number of drops per minute you finally reach the present modern practice of 1250-pound stamps dropping 8½ inches from ninety-two to ninety-five times per minute. With ample plate surface—which is of the utmost importance—the question of amalgamation in the mortars does not become so essential in the majority of ores found in California mines. The greater the crushing capacity, of course, the less the cost."

There are stamps now made in this city and in use in this State that weigh 1400 pounds each.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER VI.

By GEO. F. BECKER.

The free gold in the matrix, like the pyrite, seems to be in two different conditions. Dr. Koch found the metal in minute crystals, or in irregular, sharp-cornered, hackly aggregates. Mr. Pelikan observed it in irregular lumps, grains and scales, which, in his opinion, correspond beyond a question to alluvial occurrences. According to Mr. De Launay, the gold almost always occurs as extremely minute scales, often so thin as to be translucent, very rare exceptions being aggregates of gold on the white quartz veins, small masses of free gold crystallized by secondary solution in the banket and coatings on joint planes. Mr. Crosse also has found evidence of the existence of gold in a crystalline condition. In my slides the gold in the matrix corresponds most closely to Mr. De Launay's description. It appears in irregular flakes and scales, which often conform to the accompanying sand grains, as if pressure had molded the metal. The grains are not smooth, but neither have they either the crystalline appearance or the hackly surface of gold in vein quartz. The scales are often excessively thin, and pass over into mere yellowish-brown stains in which, by the help of direct sunlight, shining yellow points can be observed. The smaller scales of gold found on beaches are not ordinarily smooth, but they are smoother than those of the banket. I believe that pressure and the roughness of the surrounding detritus have determined their outlines to a large extent in the pudding stone.

Besides the more important minerals of the banket, Dr. Koch found in the matrix magnetite (also noted by Mr. Curtis), zircon, rutile, tourmaline, muscovite, chlorite and a colorless highly refracting mineral not determined. Mr. Pelikan found biotite and a greenish mineral, perhaps identical with Dr. Koch's, which he suspects of being pyroxenic. Dr. Hatch notes marcasite, copper pyrite, blende, galena, ilmenite and magnetite. He also records that Mr. Crosse has detected corundum by chemical means. I have repeatedly found pyrrhotite in the mines (for example, in the Crown Deep), but only in association with the white quartz veins referred to above. There is either magnetite or hematite among the pebbles of my slides, and zircons were observed. The main mass of the matrix consists, besides gold and pyrite, of sand grains, chlorite and sericite and secondary quartz. It is interesting and important to compare this matrix with slides of the quartzite adjoining the banket, because many grains which might be interpreted as secondary in the matrix are there seen to be mere sand. In both quartzite and matrix it is apparent that the sand grains have been largely attacked by sericite and that a portion of the irregularity of outline is due to this cause. The matrix also contains prisms, often grouped in fan-shaped aggregates, of a colorless secondary mineral, possibly an amphibole. The same or a similar mineral was noted by Koch and by Pelikan. Its determination is not essential for the purposes of this paper.

Distribution of Gold in Banket.—It is well recognized on the Rand that, other things being equal, the coarser pebble carries the greatest quantity of gold. Usually the rich ore is heavily sulphureted, but this is not invariable. As a rule, the thinner portions of reefs are richer than the thicker portions. It is usually the under portion of a coarse streak which is the richest, but such a coarse streak is sometimes met with in the lower portion of a reef and sometimes in the upper portion. There is in this respect no general rule. It is said that the sandstone near the banket in rare instances carries gold. It is known, however, that in some alleged instances of this kind the gold was really confined to the parting between the sandstone and the banket. The banket is patchy. There are rich patches and poor ones, rich patches in poor ones, and poor patches in rich ones. Sometimes these patches have an elongated form, and then are often called "chutes." Opinions differ among managers as to whether there are on the Rand any real continuous chutes or channels, such as are almost invariably found in gold-bearing quartz veins. I could learn of no case which was an indubitable chute as distinguished from an elongated patch. As a rule, the bodies are certainly patches, and, if there are true chutes as well, two distinct types of deposit are present. The general uniformity of appearance and conditions militate against this view.

It has already been mentioned that the Lower Cape is intersected by numerous dikes, mostly of

* Eighteenth Annual Report Mineral Resources of the United States.

diabase or closely allied rocks, these dikes being connected in the most evident and intimate manner with the formation of the white quartz seams which carry pyrrhotite and rarely pockets of gold. I made a special effort to ascertain whether the dikes are in any way connected with the tenor of the banket, and consulted many of the most experienced managers on the subject. There is, I believe, no connection whatever. The ore at and near a dike is sometimes rich and sometimes poor; a single dike will intersect one stope, or one reef, at a point where the assays are high, and will cut another working or another stratum of pudding stone in a poor patch. The conditions are such as they would be if, after ore deposition were complete, the country has been disrupted and injected with dikes having no connection with the deposition of gold in the banket. Mr. Launay come to precisely the same conclusion, and emphasizes it by an "assay plan" with the dikes drawn into it, and this diagram fully justifies his position. On the other hand, Mr. P. R. Krause insists that the dikes and the distribution of gold are intimately related. He is unable to cite any valid evidence in favor of his view, confessing that the only direct "demonstration" of the connection between mineralization and the eruptive rocks is the occurrence of chlorite and talc in the matrix of the conglomerates. I presume that for talc one should read sericite. As a matter of fact, micas, including sericite, are distributed through the Lower Cape, as they are in most sandstones; and chlorite, the most ordinary decomposition product of mica, is very common in ancient sandstones or quartzites. Talc is not more significant in this respect than chlorite.

Theories of Deposition.—In the foregoing pages an attempt has been made to gather all the more striking facts which it is necessary to consider in testing the theories propounded to account for the deposition of gold on the Rand. One of them must be right.

The theory that the banket reefs are of alluvial origin, representing metamorphosed placers, was probably the earliest to be suggested, and was held as long ago as 1887, when gold production first began. Who first advocated this solution I am unable to state. It has been supported in 1891 by Mr. De Launay, who has since adopted another view, and by Mr. Pelikan in 1894.

In 1888 Mr. W. H. Penning was led, mainly by the character of the gold (which he describes as occurring in sharp gains, not waterworm), to state: "I am convinced that it was deposited—at the same time the gravels were being accumulated—from water holding gold in solution." This is the opinion expressed by Mr. De Launay in his latest work, 1896.

In discussing Mr. Penning's paper, Mr. W. Topley suggested that the water which, percolating through the already formed conglomerates, deposited the gold may have been at a high temperature. In 1890 my friend, Mr. J. S. Curtis, published a paper on the banket, in which he states that Mr. Gardner F. Williams, now manager of the Kimberly diamond mines, considered the gold in the conglomerate as not alluvial but quartz gold, deposited after the upheaval of the strata. Mr. Curtis accepted this view, considered the deposits as closely resembling lodes, and referred the impregnation of the conglomerates to the action of the dikes. This opinion is based on the angular character of the gold and on the presence of pyrite both in the banket and in the dikes. Had the iron sulphide of the banket been alluvial, Mr. Curtis says, "there would have been pebbles of pyrites." Of course the large proportion of rounded pebbles of pyrite in the banket was then unknown. Mr. Curtis explained the fact that gold is not found in the sandstone by the relative porosity and openness of the conglomerate. The view of the deposits first distinctly expressed by Mr. Curtis is that to which Dr. Koch leans, and which is adopted by Messrs. Hatch and Chalmers, and by almost all the engineers on the Witwatersrand.

Impregnation Theory.—None of the theories are free from objections, real or specious. The impregnation theory implies that there must be deep fissures through which the auriferous solutions obtained access to the once barren banket beds, and that the solutions permeated the coarse beds to the practical exclusion of the finer sandstone strata. A system of fissures such as would be needed to convey metalliferous solutions certainly exists in the dikes and faults so abundant on the Rand. There are also less pronounced partings or joints, often nearly parallel to the conglomerate beds. These last are very important in stoping the ore, and they are well known to all managers. All of these dislocations were produced during the upheaval of the beds from a nearly horizontal position into that which they now occupy. The gold in the banket is not distributed in any apparent relation to the dislocations. Not only do the dikes cut the reefs in poor and rich patches indiscriminately, as was pointed out above, but such of the dislocations as are in sandstone or in quartzite are, as a rule, absolutely barren. The fissures are also almost altogether wanting in some localities where the ore is nevertheless of good grade. This is the case in portions of the Geldenhuis Deep and of the Simmer and Jack. In these mines there is often an inconvenient absence of any partings to which stoping can be carried, and this "freezing" is not attended by any falling off in the assays. On the other hand, the white quartz veins are manifestly related to the dikes, often starting from them or accompanying them, and themselves not dislocated by the fissure system to any greater extent than is easily accounted for by slight renewals of movement postdating the main upheaval. The white veins, however, cut and fault the banket, but without enriching or impoverishing it. The only natural conclusion is that the dikes and white veins postdate not merely the formation of the conglomerate, but the conglomeration of gold in the banket. The deep fissures which afforded channels for the ore-bearing solutions might be narrow, as a rule; but it is hardly possible that all of them should be so, and it is most improbable that the ore which they contained should not be rich, as rich as the banket would be if all the pebbles were removed from it. Now, no such "rake veins," as they would be called, have been met with on the Rand.

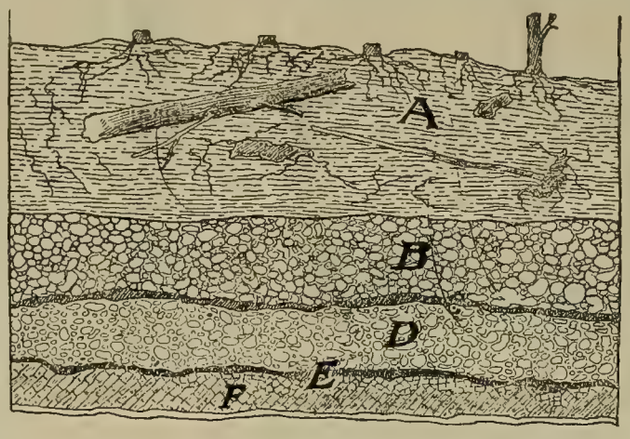
(*To be Continued.*)

Geology of the Yukon.*

NUMBER V—CONCLUDED.

The Tahkandit series shows in a marked degree less decomposition and metamorphism than the Rampart series, and there is a probable unconformity existing between the two.

Above the Tahkandit series comes the Mission creek series, which is, in part at least, Cretaceous, and is made up of black calcareous and feldsparic shales, impure thin-bedded limestone, gray sandstone and conglomerate. Seams of impure coal and obscure plant remains are often found, but occasional fossils show the series to have been largely a marine formation. At the base is a conglomerate, which rests on the Rampart series and Forty Mile series, and contains pebbles derived from these rocks.



A—Muck, frozen, 10 ft. to 15 ft; B—Gravel, rarely pay; C—Clay Selvage; D—Pay Dirt, 1 ft. to 5 ft.; E—Selvage; F—Bedrock, Cloritic Schist.

SKETCH SHOWING LOCATION OF PAY STREAK IN KLONDIKE PLACERS.

Above the Mission creek comes a great thickness of massive conglomerates, with coarse grits and some sandy, argillaceous limestone and impure shales. These rocks contain abundant plant remains and occasional fresh water fauna, on the evidence supplied by which they are referred to the Eocene. There are no marine fossils or other evidence of marine conditions. The conglomerates contain pebbles of the Rampart series, Forty Mile series, Birch creek series, and various other sedimentary and igneous rocks. This great thickness of fresh water beds has been called the Kenai series.

The Tahkandit series, Mission creek series and the Kenai series all show about the same amount of dynamic disturbance, there being apparently no very great unconformity separating them one from another, and all having been folded together. Sometimes these folds are gentle, sometimes broad and open, and sometimes closely compressed and vertical. Owing to this folding, there is local jointing, but all the rocks have been practically unaffected by regional shearing.

The beds overlying the Kenai series are few and scattered. On the upper part of Mission creek are partially consolidated, nearly horizontal conglomerates and grits, carrying plant remains, which appear to correspond with beds on the Porcupine and Mackenzie rivers. All these sediments are probably local accumulations in lakes of limited extent. Those on the Mackenzie, which were examined by Mr. McConnell, have been referred by Sir William Dawson, on the evidence of the flora which they contain, to the Laramie; but there is still room for the suspicion that they may be assigned to the Miocene. These beds are separated by a profound unconformity from the underlying Kenai series, being only gently tilted, while those of the Kenai are sharply folded. At the lower ramparts are cross-bedded sandstones, with fossil leaves, cones and fragments of wood. These beds are probably Pliocene. Finally come the Pleistocene and recent silt sand gravels, which are scattered all over the country as a result of deposition in the great lakes and rivers.

From the evidence furnished by conglomerates everywhere throughout this region, we know that the gold-bearing rocks, such as those of the Forty-Mile and Birch-creek series, were exposed to atmospheric erosion since the beginning of the deposition of the Mission-creek series, and probably before; and this erosion must have gone on at intervals ever since. During all this period the process of concentration went on in rivers, on beaches and in other places, precisely as at the present day, so that portions rich in gold, or placers, must continually be forming. At times an extremely rapid erosion and deposition, moreover, such as that under which the Kenai conglomeratic series was deposited, coarse gravels suitable for the accumulation of gold, were rapidly laid down. It is reasonable to suppose, therefore, that these auriferous conglomerates, or fossil placers, will, in future, be found to have a wide distribution, and may become of considerable importance from a commercial standpoint.

All the gold produced in Alaska is alloyed with a certain small amount of silver. Besides this, pure native silver is frequently found, along with gold, in minerals concentrated in the placer workings, generally in small rounded or irregular nuggets, although occasionally, as at one place in Franklin gulch, well crystallized. Native lead occurs in small nuggets on Hog'em or Deadwood creek, and nuggets of gold which come from this gulch sometimes contain native lead in small bits. Native copper, in small rounded nuggets, has been found on Little Minook and Hunter creeks.

Platinum has frequntly been found in the Yukon district, chiefly in the diggings in the upper part of the Yukon drainage system. On Twelve-Mile bar, which is 12 miles below the Big Salmon river, on the Yukon, the yield in platinum is said to have been two or three ounces to each 10 or 12 ounces of gold; the metal, however, was not saved, since the miners were ignorant of its value.

The tiny flakes or colors of gold which are found so widely distributed in the sands and gravels of streams are capable of being carried enormous distances without being destroyed, and are many times deposited and again taken into suspension by changes of current. Thus it happens that fine, or flour gold, in small quantities, may be found along the entire course of most of the rivers in Alaska. On account of this indestructibility and facility of transportation, fine gold affords no adequate index of the source from which it is derived. As the gold becomes more abundant and coarse, however, it is clear that the source is being neared. Thus, at Forty-Mile creek and on Birch creek, the bars of the main streams were richer than the bars of the Yukon, into which they flow. In this way, prospectors find continually richer accumulations, until finally, in certain gulches whose waters run into the river on which the bars have been previously worked, gold is found which is fairly coarse and in considerable quantity. In these gulches nuggets are found, and fragments of quartz and gold mixed. It is evident that these placers are nearest the true source of the gold, and that from here have been derived the finer and rarer particles which occur in the bars of the larger streams, and also the still finer and rarer particles in the rivers in which these streams empty. Therefore, in inquiring as to the source of a placer, we may pass over the widespread fine, or flour, gold in the great rivers, and also the bar diggings in the tributary streams, and confine our study to the gulch diggings.

One feature of the repert is a chapter devoted to coal in the neighborhood of the gold belt. Mr. Spurr says that the thick beds of the Kenai series are crossed everywhere by more or less coaly layers. Coal is found at Mine creek and on the Lewis river. Coal creek runs into the Yukon about eight or ten miles north of Forty-Mile creek, and there are two four-foot seams of coal here. On American creek and Napoleon creek coal is found. The rocks are invariably steeply inclined, and are often highly folded and even contorted. This difference renders the veins difficult and expensive to follow, and taken in conjunction with the low grade makes it very probable that although the coal may, in some cases, be found convenient for domestic use, it will not pay for exportation.

*Condensed from advance sheets of "Geology of the Yukon Gold Dist. of Alaska," by Josiah Edward Spurr, of the U. S. Geo. Survey.

J. B. SEMPLE of Sewickley, Pa., has patented a projectile, the path of which may be marked by the gunner during its flight. A mixture of magnesium, gunpowder and some oxidizing agent, bound together by shellac or some other gum, is so secured to the projectile as not to be dislodged during its flight.

Some Complimentary Notices.

Immediately upon the issuance of the Golden Jubilee edition notices innumerable, unanimously favorable, were received, and multitudes of commendatory and congratulatory letters also came. In a period when many other special editions of numerous papers and periodicals made notice of even a few impossible, it is especially gratifying that so many of our contemporaries made kindly comment on the one that they considered most worthy. To publish a tithe of those gracious comments would transcend our limits, for it would require another special edition to contain them, but they are none the less gratefully and cordially appreciated. To illustrate, however, the scope and character of those friendly notices all that can appear on this one page are herewith republished:

Of Exceptional Interest to All.

The big Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS, which was issued yesterday, is one of the handsomest special numbers ever issued by a technical journal and is of exceptional interest to the general reader as well as to the expert miner and the pioneer. Inside the artistic cover the pages are filled with illustrations, some interesting as expositions of mining processes and many being reproductions of old woodcuts illustrating the mining life of the Argonauts. Two pages are given to a valuable paper on "The Mother Lode of California," by Ross E. Browne, and the origin and evolution of the California stamp mill is described by C. P. Stanford. "Recollections of California Mining Life," bountifully illustrated, runs through seven pages, and among other features of special interest are, "The Beginning of Quartz Mining in California," by Almarin B. Paul, and "Gold Formations in California," by W. H. Storms. The reliability and high character which have given this old journal a world-wide reputation provide a large part of the value of this special number.—*San Francisco Call, Jan. 30.*

This Journal Is Popular With Advertisers.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS fully carries out the promises of the publishers. Its attractive features commence with the handsome cover design in three colors, and they continue until the end. The history of mining in this State is exhaustively treated, and a wealth of illustrations depict early scenes and methods. One is struck with the vast amount of business carried in the MINING AND SCIENTIFIC PRESS. The manager, Mr. J. F. Halloran, does not believe in one-time insertions, and the advertisements in the PRESS represent substantial contracts. This journal is popular with advertisers, and there must be a good, substantial basis for this popularity—it is quite possible that an ad in the MINING AND SCIENTIFIC PRESS sells goods.—*The Ad Book, San Francisco, Feb., '98.*

Nothing Better Ever Issued.

It is a pleasure to note the Golden Jubilee number of the MINING AND SCIENTIFIC PRESS of San Francisco. Nothing better, both in artistic features and contents—having regard to the purpose for which it was published—has ever issued from a printing press. The last page of the cover, although entirely devoted to an advertisement, is, with its delicate half-tone tints and gold border, simply a superb bit of work. The subject matter embraces a series of editorials and special articles written in celebration of California's Gold-Mining Jubilee. Among these latter is one on the "Origin of the California Stamp Mill," by Mr. C. P. Stanford. Another, describing the "Beginning of Quartz Mining in California," is by Mr. Almarin B. Paul. But to the general reader the one that will be found the most interesting—and most interesting it is—is the one entitled, "Recollections of California Mining Life." The article is illustrated with engravings reproduced from the MINING AND SCIENTIFIC PRESS of thirty years ago.—*Los Angeles, Cal., Review, Feb. 12.*

This Journal's Crowning Enterprise.

Like everything that comes from the MINING AND SCIENTIFIC PRESS, its Jubilee number is simply perfect. It is a statistical and descriptive souvenir to be read and preserved for reference. It summarizes the whole history of mining in the State. It traverses every grade of discovery and development in placer, hydraulic and fissure mining, from Sutter's mill to the latest methods of deep and underground workings, with such clear-cut and comprehensive precision as to be both interesting and instructive. It is the crowning enterprise of a journal that stands or falls with the mining industry.—*Mountain Democrat, Placerville, Cal., Feb. 5.*

A Marvel of Typographical Art.

One of the handsomest and most complete publications ever laid upon our desk is the Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS of San Francisco. Its makeup is a marvel of typographical art and its pages are a history of mining in California since Marshall first discovered gold in the State.—*Kokomo, Colo., Whooper.*

Greatest Paper Ever Issued on the Coast.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS of San Francisco is the greatest paper ever issued on the Pacific coast. Every mining operator should have a copy.—*Silverton, Colo., Miner, Feb. 4.*

Full of Mining History.

In gold and purple the MINING AND SCIENTIFIC PRESS commemorates the fiftieth anniversary of the discovery of gold. The Jubilee number of this valuable journal is full of mining history of much value and interest. Not the least noticeable feature of this paper is a collection of early-day scenes, taken, if our memory serves us, from Hutchins' pioneer magazine, bringing up from the almost forgotten past not alone the crudity of mining methods in those days, but also the crudities of the engraver's art.—*Plumas, Cal., Independent, Feb. 5.*

[All the old engravings were from the early files of this paper.—ED.]

No More Attractive Specimen Could Be Offered.

A buffalo-Indian-tragedy novel is the young boy's idea of a western publication, but to the grown man who prefers the actual facts no more attractive specimen of western print could be offered than the Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS of San Francisco. A copy of this splendid production, which has reached this office, is bound in cream and gold and is filled with illustrations of pioneer mining scenes in California and thrilling descriptions of the times when Marshall discovered gold at Sutter's mill. There are also many other striking illustrations quite in keeping with the high standard of the MINING AND SCIENTIFIC PRESS as a progressive and attractive chronicle of the great western mining industry.—*Pueblo, Colo., Chieftain, Feb 4.*

Suggestive of Vast Strides.

Special editions of newspapers have been as thick as leaves in Vallombrosa of late, and the exchange editor is hardly through noticing one triumph of the art preservative before another, richer and finer, is brought to his notice. Notable among these editions de lux is the Golden Jubilee number of the MINING AND SCIENTIFIC PRESS, which comes to us this week brave in green and purple and gold covers, and full to brimming with reminiscences and historical data of "the days of old, the days of gold, and the days of '49." Many of the illustrations are reproduced from cuts used on the paper thirty years ago, and are suggestive of the vast strides that have taken place in pictorial illustration since then. It is a splendid number.—*Downey, Cal., Champion, Feb. 5.*

Creditable to the Publishers.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS was a beautiful number, and one that certainly will be read with interest by the people of California. The illustrations were excellent, and altogether it is a publication that reflects great credit upon the publishers.—*Placer, Cal., Herald, Feb. 4.*

A Credit to the Art Preservative.

The Golden Jubilee number of the San Francisco MINING AND SCIENTIFIC PRESS of the 29th ult. is a grand exposition of the mining resources of our State, giving, as it does, a history of mining operations since the first discovery of gold. It is a credit to the art preservative, and its publishers may well be proud of their success in getting out so interesting and valuable a paper.—*Chronicle-Union, Bridgeport, Cal., Feb. 5.*

A Splendid Number.

The Jubilee edition of the MINING AND SCIENTIFIC PRESS is a splendid number. It contains a comprehensive history of the progress of the industry during the fifty golden years following Marshall's discovery of the nugget in the millrace at Coloma. The origin of gold found in the ancient river channels and the formation of quartz veins are treated at length. It contains a generous number of engravings showing mining scenes from early days to the present.—*Colfax, Cal., Sentinel, Feb. 4.*

A Magnificent Paper.

The Jubilee number of the MINING AND SCIENTIFIC PRESS of San Francisco was a magnificent paper, containing a graphic account of the discovery of gold in California and the subsequent lively incidents connected with the great rush of gold-seekers to the Pacific coast. The illustrations are numerous and beautiful, and the whole paper bespeaks the employment of the best brains and typographical skill.—*Wurd, Colo., Miner, Feb. 4.*

Articles All by Able Writers.

The finest Jubilee edition of any of the San Francisco papers that we have seen is that of the MINING AND SCIENTIFIC PRESS. Its articles are all by able writers and the paper is not crowded with boom advertising.—*Mirror, Sisson, Cal., Feb. 3.*

Interesting and Attractive.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS, which came to hand this week, is an exceedingly interesting and attractive number, exhibiting in the mechanical get-up the highest and best art of the typographer and engraver.—*Mining Journal, Grant's Pass, Or., Feb. 5.*

Was a Splendid Work.

The Midwinter mining edition of the San Francisco MINING AND SCIENTIFIC PRESS was a splendid work, and illustrates that the PRESS is in the lead as the representative of the great industry of the coast.—*Shasta, Cal., Courier, Feb. 5.*

A Task Admirably Performed.

The Golden Jubilee number of the MINING AND SCIENTIFIC PRESS of San Francisco is a superb edition of 52 pages, elegantly illustrated and containing much information of real value. It was certainly very proper that a journal devoted to California's great mining industry should commemorate the fiftieth anniversary of the discovery of gold in this State by issuing a special edition showing the progress that has been made in gold production during the half century that has passed since Marshall picked up those nuggets in the mill race. This task the MINING AND SCIENTIFIC PRESS has admirably performed. Its special edition is historically and practically of high value.—*San Diego, Cal., Union Jan. 31.*

A Grand Edition Worth Keeping.

The Jubilee number of the MINING AND SCIENTIFIC PRESS, which was issued Saturday, January 29, 1898, is a grand edition and well worth procuring and keeping for reference. It is devoted to the mining interests and gives an interesting history of the discovery of gold in California and a general history of the mining up to the present day in California, together with pictures of mining implements and machinery of '49 and those of the present day.—*Mariposa, Cal., Gazette, Feb. 5.*

Of Sterling Character and Unblemished Reputation.

On the 29th of January the MINING AND SCIENTIFIC PRESS of San Francisco issued a Golden Jubilee edition of fifty-two pages. The cover design is a striking and artistic piece of work in colors, being appropriate for the jubilee occasion. This journal and its management are to be complimented on the success achieved by this publication. It is a representative journal of its class, and its sterling character and unblemished reputation enables it to command the respect of the commercial world. The Jubilee number has a large advertising patronage.—*Modern Machinery, Chicago, Feb.*

Contains a Fund of Information.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS, containing 52 pages, is a beauty. It is richly illustrated and contains a fund of information concerning the finding of gold at Sutter's mill January 19, 1848, and the progress of the mining industry on the coast down to the present time.—*Mercur, Utah, Mercury, Feb. 4.*

The Foremost Mining Paper.

The MINING AND SCIENTIFIC PRESS of San Francisco, which is the foremost mining paper on the Pacific coast, issued a magnificent "Golden Jubilee Edition" January 29th, in honor of the celebration of the fiftieth anniversary of the gold discovery in California.—*Tintic Miner, Eureka, Utah, Feb. 4.*

Every Miner Ought to Get a Copy.

The Jubilee number of the MINING AND SCIENTIFIC PRESS is a very handsome souvenir, giving a fine historical sketch of early mining in California, with the various improvements since. Also contains handsome illustrations of the old and new style quartz mills, the hydraulic process, dredger machinery, elevator process, etc. A good description with diagram occupies one full page, relative to the R. H. Campbell hydraulic elevator, now doing good work at the Cariboo mines in British Columbia, at a depth of over 250 feet below the surface, in raising pay gravel. This Jubilee issue is one that every miner ought to get a copy of and note the great improvements in working quartz, river, placer and drift mines.—*Yreka, Cal., Journal, Feb. 1.*

An Authority on Mines.

The MINING AND SCIENTIFIC PRESS of San Francisco to-day issues a Jubilee number. The paper is an authority on Pacific coast mines.—*Del Norte, Cal., Record, Jan. 29.*

A Magnificent Number.

The San Francisco MINING AND SCIENTIFIC PRESS commemorated the Golden Jubilee of the discovery of gold in California by the issuance of a magnificent number of 52 pages, containing much matter of interest and importance to miners and others.—*Jacksonville, Or., Times, Feb. 1.*

An Issue To Be Proud Of.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS, issued at San Francisco on the 29th, is one of the handsomest publications that has reached us. The cover is artistically printed in colors, with a picture of Marshall, the discoverer of gold, and the locality where the discovery was made. The inside pages of the number are replete with interesting and valuable information to the miner and those interested in mining. It deals with the primitive method of mining in the days of '49 as to those now in vogue, and has much that will interest those who contemplate going north. Taken altogether the issue is one that the PRESS may well be proud of.—*Del Norte Record.*

Interesting and Instructive.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS appears in an illustrated cover and devotes much space to interesting and instructive articles upon the "Origin of the California Stamp," "A Model California Stamp Mill," "The Mother Lode," "Beginning of Quartz Mining," "Recollections of Early Mining Life," etc.—*Placer, Cal., Republican, Feb 3.*

Invaluable for Future Reference.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS surpassed expectation in the artistic manner in which it was gotten up. Its compilation of early-day mining in this State, illustrations and general makeup make it invaluable for future reference to every person interested in the State and its progress.—*Herald of Trade and Finance, San Francisco, Feb. 4.*

A Credit to the Office, the City and the State.

The illustrated Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS, published at San Francisco, has been duly received at this office, and is one of the most artistic typographical productions that has reached our table during the holiday season. It contains a beautiful pen picture of the history of gold mining in California from the primitive days of '49 up to the present time, and in fact the publication is not only a credit to the publishers and San Francisco, but to the whole State of California.—*Merced, Cal., Star, Feb. 3.*

Congratulations and Best Wishes.

The Jubilee edition of the MINING AND SCIENTIFIC PRESS, commemorating the fiftieth anniversary of the discovery of gold in California, is a typographic beauty as well as an interesting compendium of historical data bearing on the important event. Its prosperous advertising pages bear eloquent testimony to the fact that the PRESS has not lagged in the onward march of progress enjoyed by the wonderful coast State, which up to this year has enjoyed a monopoly of the title, "The Golden State." The *Record* tenders congratulations and best wishes to the management of the MINING AND SCIENTIFIC PRESS upon its success.—*Daily Mining Record, Denver, Colo., Feb. 1.*

Much Interesting Reading Matter.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS, San Francisco, Cal., contains much interesting reading matter concerning California's gold fields in early days.—*Courier, Grant's Pass, Or., Feb. 1.*

Excellent From Start to Finish.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS comes to us with finely illuminated covers and about 50 pages of excellent matter. Ross E. Browne contributes a fine article on "The Mother Lode of California," with cuts and illustrations that show a thorough familiarity with the subject. C. P. Stanford and A. B. Paul follow with articles respectively on "The Origin of the California Stamp" and "The Beginning of Quartz Mining in California." W. H. Storms gives his ideas on "Gold Formation in California." "Recollections of California Mining Life" are given in accuracy of detail by another pioneer contributor. The number is excellent from start to finish.

Well Worthy of Preservation.

The big Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS is one of the handsomest and most interesting numbers ever issued by a technical journal. The articles within the beautifully embellished covers are reminiscent, to a large extent, of the discovery of gold in California by Marshall, and in a separate article the journal offers strong proofs that the date of the discovery of gold was January 19, 1848, instead of the 24th of that month. The entertaining articles are profusely illustrated, those of bygone days and the methods of gold-extracting then, by old wood-cuts used by the MINING PRESS thirty odd years ago. This special number is a complete resume of mining and mining methods from the days of the Argonauts to the present time. It is a historical number well worthy of preservation.—*Georgetown, Cal., Gazette, Feb. 4.*

Filled With Choice Material.

The Jubilee edition of the MINING AND SCIENTIFIC PRESS is at hand, and a beauty it is, too. It is filled with choice material of interest to every miner in the land, giving as it does many cuts and the authentic history of the first gold discovery in California by Marshall.—*Lemhi Republic, Salmon, Idaho, Feb. 5.*

A Magnificent Number.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS of San Francisco is a magnificent number of 52 pages, profusely illustrated and filled with interesting historical matter and much valuable information concerning the California mining industry.—*San Jose, Cal., Mercury, Feb. 9.*

An Artistic Number.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS of San Francisco is one of the best and most artistic numbers of the year. It is largely historical and is profusely illustrated.—*Kelso, B. C., Kootenaian, Feb. 2.*

Shows Commendable Enterprise.

The Golden Jubilee edition of the MINING AND SCIENTIFIC PRESS of San Francisco has been placed on the *Democrat* exchange table. The publication is a valuable one, treating as it does historically of the mining resources of the State of California from the first discovery of gold in that State in 1848 up to the present time. The enterprise shown by the publishers of the PRESS by this issue is commendable and more than ever shows the merit of this mining journal.—*Baker City, Or., Democrat, Feb. 2*

Generally Useful and Valuable.

The Jubilee number of the MINING AND SCIENTIFIC PRESS, issued January 29, is perhaps the most generally useful and valuable compendium of early mining history that has been published in the State in honor of the gold discovery. Its contributors are mostly mining men of experience and close observation. The early history of mining has received careful attention and the articles are well illustrated.—*Republican, Placerville, Cal., Feb. 3.*

The Whole History of Mining Reviewed.

We are in receipt of a fine Golden Jubilee edition issued by the San Francisco MINING AND SCIENTIFIC PRESS. The whole history of mining in California is reviewed in a series of articles which embrace every branch of the subject from the discovery of gold in 1848 to the latest modern improvement in the elaborate stamp mill of the present day. The paper is profusely illustrated, and will be valuable to all who are interested in the discovery and development of the rich gold mines in that State.—*Bisbee, Ariz., Orb, Feb. 5.*

Coast Industrial Notes.

—The San Francisco free market project is moribund.

—Santa Monica, Cal., is to have a $500,000 beet-sugar factory.

—The Golden Jubilee Committee report: Collections, $21,753 33; expenditures, $20,450 10; balance, $1302.23.

—In 1897 the value of the dry wines made in this State amounted to $25,500,000; brandy, $1,000,000; sweet wines, $5,000,000.

—In '97 the St. Paul & Tacoma Lumber Co., of Tacoma, dressed over 35,000,000 feet of lumber; the Grays Harbor Commercial Co., 29,000,000 feet.

—Los Angeles contains the largest manufactory of bee hives and apiarian supplies west of the Missouri river. California produces more and better honey than any other State in the Union.

—The Tacoma, Wash., machine shops report a scarcity of first-class machinists. Good machinists are paid from $3 25 to $3 50 a day. Machinists, ship-builders and other skilled workers are in demand on Puget Sound.

—The Union Beet Sugar Co. of San Francisco has let a contract for a $500,000 beet sugar plant to be located on the Goldtree tract near Santa Maria, Cal. E. C. Burr of the Alameda Sugar Co. is to be manager.

—Trustees Los Angeles oil companies have under contemplation the construction of a tank steamer for transportation of crude petroleum to San Francisco, piping the oil to San Pedro, or other available coast point.

—The Alaska craze has created an enormous demand for coast vessels, steam and sail, and besides local craft, several are on the way from the Atlantic side. San Francisco and Seattle shipbuilders are busy supplying the demand.

—It is now proposed to build three feeders for the Sierra road to radiate from Jamestown, Cal., to be operated by electricity. The three proposed roads would connect Jamestown with Sonora, Jacksonville and the Stanislaus river.

—In reference to the Klondike business the Canadian Pacific Telegraph Co. has decided to lay an additional cable between Vancouver and Victoria. The company is also stringing another heavy copper wire between Montreal and Vancouver.

—The largest single payment of customs at Port Townsend, Wash., for February, was $46,000, paid as duties on 14,000 barrels of cement brought by the British ship Wray Castle, to be used on the gun emplacements of the Marrowstone point fortifications.

—Talk of an opposition steamship line between South and Central American ports and San Francisco is revived. The Compania Sud American de Vapores, and the Pacific Steam Navigation Co., are said to be considering the venture, the former company to leave weekly, touching at Coquimbo, Antofagasta, Iquique, Mollendo and Callao, arriving at Panama in ten days. Then the latter to take up the running, touching at the principle Central American and Mexican ports, making the run to San Francisco in twelve days; thus the passage from Valparaiso could be made in a little over three weeks.

—Creamery butter being high priced in California, the market is flooded with "process butter," sold at a profit for 25 cents a pound, at which price there would be a loss on creamery butter. To make this process butter, odds and ends of dairy butter, difficult of sale, are bought up, then melted, the oil sweetened by the addition of some chemicals and churned with milk. This manufactured butter presents a good appearance and tastes well, but it will not keep. As this product, however undesirable it may be, is really butter and not made from animal fats, it does not come under the law relating to oleomargarine.

—The gold of the Yukon is beginning to yield up of its treasures a small share to the public revenue. A remittance from Gold Commissioner Fawcett, at Dawson, has arrived at Ottawa, amounting to $130,000. Of this, $50,000 was left by two Scandinavians named Karlson, brothers, who died of typhoid fever last fall. The money is to be forwarded by the authorities to their father in Norway. The $80,000 is the proceeds of fees. To this may be added another $85,000, which will make a total revenue from the Yukon of $165,000 to date.

Personal.

J. O. JONES, Supt. South Fork mine, Forest, Cal., is in San Francisco.

A. DE LAND has taken charge of the Oregon Bonanza mine, Ashland, Or.

F. S. ROUMAGE, Supt. Maus mine, Forest Hill, Cal., is in San Francisco.

F. ZEITLER, Supt. Champion mine, Nevada City, Cal., is in San Francisco.

C. O. ALLEN has taken charge of the Old Glory mine near Phœnix, Ariz.

R. C. WALRATH, Mgr. Reward mine, Nevada City, Cal., is in San Francisco.

O. L. BARTON, Supt. Herman quartz mine, Westville, Cal., is in San Francisco.

W. R CHADBOURNE, Mgr. Mikado mine, Leadville, Colo., is in San Francisco.

H. E. PICKETT, Mgr. Grand Victory mine, Placerville, Cal., is in San Francisco.

S. C. WILMANS, Supt. Boulder mine, Shingle Springs, Cal., is in San Francisco.

H. KRUSE succeeds R. Sutton as Supt. of the Utah Mg. Co., Fish Springs, Utah.

C. H MALLON, Supt. Brunswick mine, Grass Valley, Cal., is in San Francisco.

WM. MCKINLAY, Supt. Providence mine, Nevada City, Cal., is in San Francisco.

W. T. GRAHAM, owner in the Jupiter Con. mine, Auburn, Cal., is in San Francisco.

SENATOR CHAPMAN, Gen. Mgr. Taylor mine, Garden Valley, Cal., is in San Francisco.

CY. MULKEY, Supt. Spreckels & Mulkey mine, Fairplay, Cal., is in San Francisco.

F. T. FREELAND becomes Gen. Mgr. of the Ibex M. Co., Leadville, Colo., March 1st.

E. L. HALL has succeeded W. D. Johnson as Supt. of the Gold Point at Sunshine, Utah.

E. N. LINDSAY is the new Supt. of the Grand Central M. Co., Las Amarillas, Mexico.

T. H. SELBY has returned to San Francisco from mine examination at Nacosari, Mexico.

F. S. ROUMAGE, Horseshoe Bar and Maus mines, Forest Hill, Cal., is in San Francisco.

GEO. MAINHART, Supt. Omaha and Bullion mines, Grass Valley, Cal., is in San Francisco.

S. GRANGER, Mgr. Pittsburgh mine, Grass Valley, Cal., returned home from San Francisco.

E. W. HOPKINS, Pres. Gold Hill M. Co., Grass Valley, Cal., has returned to San Francisco.

G. W. FLETCHER, owner in the Reddick gravel mine, Grass Valley, Cal., is in San Francisco.

G. C. STRODE, part owner of the Strode mine in Trinity Co., has returned home from San Francisco.

N. W. MOODY, Prest. Tuolumne County Mining and Development Co., has returned from Sonora to Fresno.

H. J. REILING has resigned the presidency and general managership of the Gold Dredging Co., Bannack, Montana.

H. BRATNOBER arrived in San Francisco this week from London. He says the Rothschilds will build a railway from Skaguay to the Klondike if suitable franchise can be secured from Canada. In this connection Hamilton Smith is in Ottawa.

JUDGE JOHN F. DAVIS of Jackson, Cal., has returned home from San Francisco. Judge Davis was the orator of the evening at the Mining Fair on Washington's Birthday.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING FEBRUARY 15, 1898.

593,137.—CARRYING APPARATUS—J. Anderson, Walla Walla, Wash.

593,281.—CAR FENDER—H. W. Bodeman, S. F.

593,217.—TREE PULLER—E. P. Boden, Santa Clara, Cal.

593,161.—SASH HOLDER—L. H. Bowman, Walla Walla, Wash.

593,178.—FISHING REEL—F. J. Boyle, Tacoma, Wash.

593,236.—BOTTLE STOPPER—J. A. Donahue, Los Angeles, Cal.

593,171.—ROLLING PIN—A. B. Fowler, Shelton, Wash.

593,143.—BICYCLE LOCK—J. J. Hall, Los Angeles, Cal.

593,988.—EXCAVATOR—F. H. Heath, Tacoma, Wash.

593,040.—THRUST BEARING—F. H. Heath, Tacoma, Wash.

593,037.—TROLLEY—C. H. Johnson, Elmhurst, Cal.

593,243.—TABLE—J. J. Klingler, Santa Cruz, Cal.

593,251.—SASH HINGE—H. M. Pitman, S. F.

593,259.—SPRING GEAR—S. Q. Saunders, New Bridge, Ogn.

28,281.—DESIGN—SPOON HANDLE—H. J. Klumpp, Portland, Ogn.

28,300.—DESIGN—HARP GUITAR FRAME—C. Knutsen, Port Townsend, Wash.

NOTE.—Plain and Certified Copies of U.S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC PRESSURE EQUALIZING BEER FAUCET.—F. W. Shields, L. A. Spinelli and C. R. Martin of San Jose, Cal. No. 598,579. Dated Feb. 8, 1898. This invention relates to an improved device for drawing beer. It consists of a means for automatically reducing and equalizing the pressure from the cask to the receptacle so that beer or other effervescent liquid can be drawn at all times under a regulated pressure, thus avoiding the great mass of foam or froth which is caused by the escape of gas from the liquid when drawn in the ordinary manner. The device is so constructed as to regulate the pressure by an automatic mechanism and to retain the gas pressure within the cask or receptacle until all the liquid has been drawn therefrom. It consists essentially of a casing having a draw-off at one end, a hollow stem at the opposite end adapted to fit directly into the cask or receptacle and an intermediate chamber into which the liquid is received, a pressure regulator between the inner end of the stem and the adjacent end of the receiving chamber, this regulator consisting of a central body with exterior passages, said body having a chamber at one end in communication with the receiving chamber, a valve stem movable in said body having at one end a valve to close the passage through the hollow stem and a piston fixed to its opposite end of larger area than that of the valve, so that whenever the pressure within the receiving chamber increases beyond the desired point, it will act upon the piston and close the valve at the opposite end to prevent any further escape from the cask to the receiver. Whenever the faucet is opened to draw any liquid, the pressure in the receiver is reduced, the pressure on the valve overcomes that on the piston, allowing it to open for the further passage of liquid into the receiver. The faucet is peculiarly constructed, having a tapering body fitting a corresponding shell in such a manner that the faucet is opened by moving the body into the larger diameter of its shell or chamber and allowing the liquid to flow around it and pass out in a thin sheet.

TREE OR VINE PULLERS.—Edmund P. Boden, Santa Clara, Cal. No. 599,217. Dated February 15, 1898. This invention relates to an apparatus which is especially designed to pull small trees, vines and bushes from the ground. It consists essentially of a four-wheeled vehicle, the front and rear wheels of which are situated at a considerable distance apart, an inclined truss framework extending between the two sets of wheels having a track or runway from one end to the other, a truck adapted to travel upon the track having a chain or means to connect it with the tree or vine to be pulled when the truck is at the lower end of the runway. When the wagon is drawn ahead, the truck runs up the inclined plane of the framework and thus acts to pull the tree.

Recent California Mining Incorporations.

Cleveland G. M. Co., Monterey; capital stock $100,000, all subscribed; W. Hannon, T. J. Field, E. Michaelis, R. C. Sargent, J. E. Sexton.

Tri Color Con. M. Co., San Francisco; capital stock $5,000,000, all subscribed; C. S. Long, C. W. Everett, C. C. Hamilton, W. G. Long, P. V. Long.

Van M. Co., San Francisco; capital stock, $100,000; subscribed, $50; W. L. Dickenson, W. K. Speed, A. R. Cotton, B. Baldwin, G. S. Buckley, W. B. English.

Pacific M. Co., Pomona, Cal.; capital stock, $250,000; subscribed, $60; F. E. Adams, A. D. Thatcher, M. C. Allen, S. F. Davis, C. A. Ludlow, E. Barnes, S. W. Arbuthnot, E. C. Cady, G. F. Kendall.

Normandy G. M. Co., San Francisco; capital stock, $120,000; subscribed, $160; S. Johnston, P. Caroe, J. L. Mine, L. W. Kauffman, C. W. Cross.

California-Alaska M. and T. Co., San Francisco; capital stock, $100,000; subscribed, $1800; M. Kane, D. A. Reed, A. W. Von Schmidt, C. E. Naylor, J. A. Miller.

The M. and I. D. Co., San Francisco; capital stock, $100,000; subscribed, $250; W. R. Boon, W. A. Bushnell, C. M. Weymann, C. J. Armbruster, H. L. Weber.

Recently Declared Mining Dividends.

Victor, Colo., $50,000; payable March 1.

Gold Coin, Colo., 1 cent per share, $10,000; payable Feb. 25; total to date, $40,000.

Napa C. Quicksilver M. Co., California, 10 cents quarterly dividend and 10 cents extra per share, $10,000; payable April 1.

New Idria Quicksilver M. Co., California, quarterly, 10 cents per share, and an extra of 5 cents per share, $15,000; payable March 1.

Ætna Con. Co., California, 10 cents per share, $10,000; payable March 10.

Mammoth, Utah, 5 cents per share, $20,000; payable March 1.

Moon-Anchor, Colorado, 2½ cents per share, $15,000; payable March 2.

Lillie G. M. Co, Colorado, 1 cent per share, $9000; payable March 1.

Raven G. M. Co., Colorado, 1 cent per share, $15,000; payable March 1.

Dutch M. & M. Co., Cal., 5 cents per share; Feb. 23.

Big Seven mine, Montana, $8000; payable March 1.

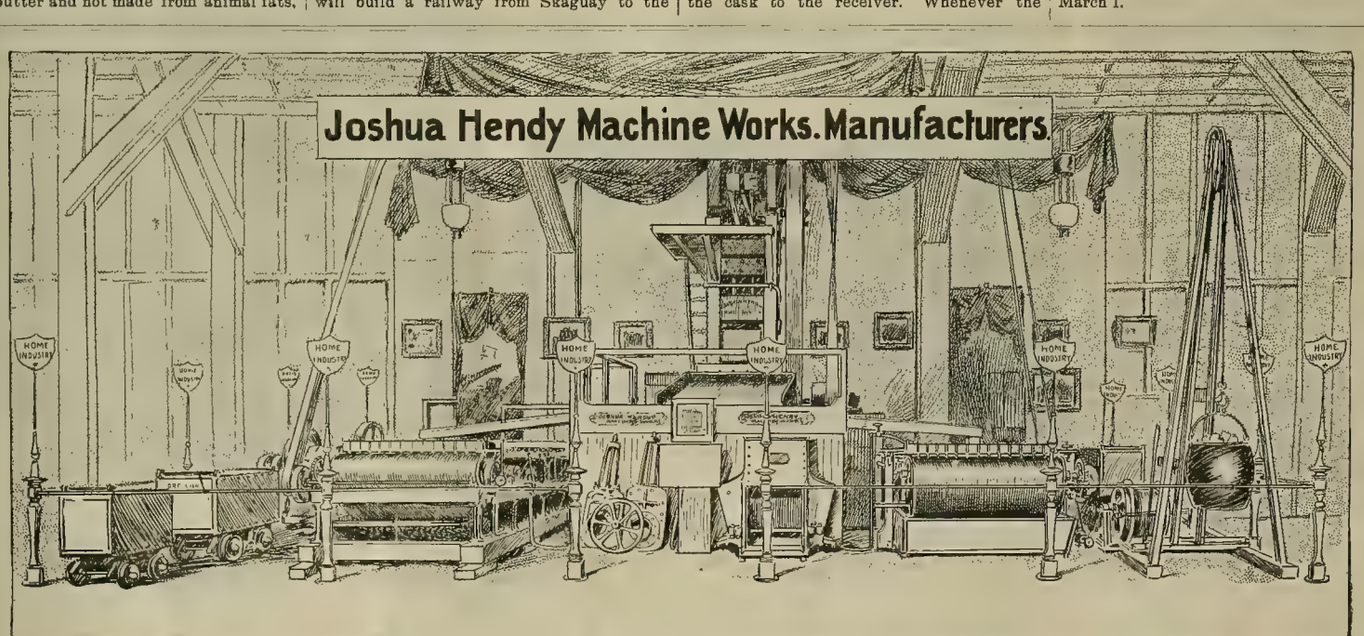


EXHIBIT OF THE JOSHUA HENDY MACHINE WORKS AT THE GOLDEN JUBILEE MINING EXPOSITION.

This exhibit, which has attracted considerable attention among mining men, comprises hydraulic and quartz mining and milling machinery, and consists of hydraulic gravel elevators, giants, water gates and pipe, "Hendy triple discharge" two-stamp mill, "Challenge" ore feeder, "Triumph" and Hendy-Norbom concentrators, horse-power, hoisting whim, ore crusher, ore buckets and cars, hoisting, horizontal and vertical engines.

Single vs. Multiple Cylinder Engines.

Not every engineer is clear in his mind as to how an engine with three or four or even five cylinders can be more economical or have a greater efficiency than an engine doing the same number of expansions in a single cylinder. Briefly stated, it is because the extremes of temperature in each cylinder are kept more close together, that the multiple cylinder engine owes what merit it possesses.

Steam at 200 pounds pressure has a temperature of about 387°, and at atmospheric pressure we all know that its temperature is 212°. This gives a difference of temperatures of 175°, which the steam has to pass through during every stroke of the piston. If a condenser is used, and the temperature run down to 160°, the difference will be increased to 227°.

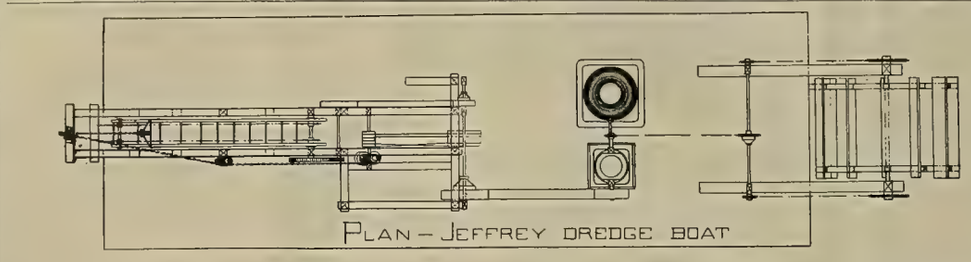
The above is a big variation in temperature for the walls of a cylinder to pass through twice during each stroke of an engine, and from the nature of the material of which the cylinder is made such a thing is impossible, therefore the steam is exposed to a cooling influence, and condenses, thus reducing its volume, and consequently its pressure, before the steam has a chance to act fully on the piston. This is the real reason why there is a loss—the cold iron cools the steam and reduces the pressure of the steam.

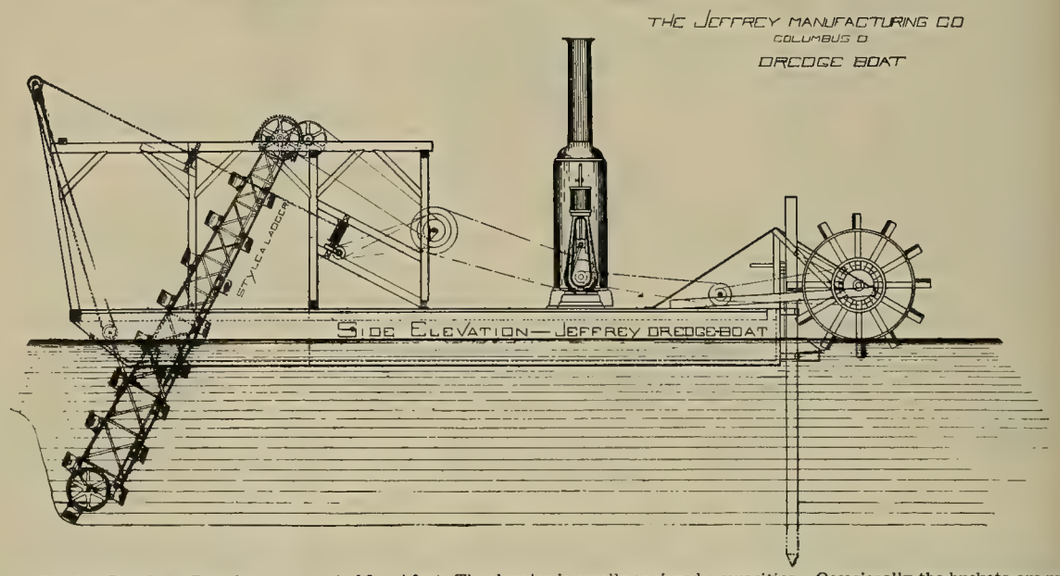
When the expansion is cut up into four parts there is only about one-fourth as much difference in temperature between the incoming and outgoing steam, or about 57° in each cylinder. This difference is easier handled, as it does not cool the steam as much, and if a little reheating is done to the steam between the several cylinders, nearly all the loss from cylinder condensation can be avoided. There is something to be deducted from the saving to be made in this manner, and that is the loss by friction of the many extra cylinders and pistons, valves and connections, and the loss of heat in the reheating of the steam mentioned above. It depends upon surrounding conditions how far the number of cylinders and steam jacketing can be made to pay, hence the difference of opinion among engineers upon this subject—their experiments have not been conducted alike.

VERY little attention has yet been given to the matter of utilizing the waste heat of the exhaust gases from gas engines, in spite of the fact that improvements in this direction promise a not inconsiderable economy. In an average gas engine the escaping gases are heated to about 950° Fahr., and if the maximum temperature be assumed as, say, 2700°, the theoretical efficiency would be about 53 per cent; but if the temperature of the exhaust gases could be usefully lowered to 300° with the same initial temperature, this theoretical efficiency would raise to 76 per cent, with a corresponding increase in actual efficiency. This is sufficient to show what advantages may be gained in this direction; but it is noticeable that the most successful gas engine builders appear to regard the method of external refrigeration as a necessary evil, and make no very serious attempt to do away with it. The case as it stands at present is that, putting aside the losses due to radiation and conduction, which total to about 65 per cent, we have about 17 per cent of the total heat of combustion converted into available power, while an almost equal quantity of heat passes away with the exhaust gases without having performed any duty.

IN a paper read before the Association of Graduates of the Ghent Technical School, Mr. L. Breda described the wet process of extracting copper from pyrites in use near Antwerp. The ore, containing 3 to 4 per cent of copper, is roasted, crushed and roasted with salt. The chlorinated ore in quantities of twenty-five tons is twice washed with 660 gallons of water, then with the waste liquor from the precipitating tanks, then with dilute warm sulphuric acid, and finally with warm water. The washed ore at last contains only 0.2 per cent of copper. The liquor is run into tanks, and the copper precipitated by scrap iron. The amount of copper left in the waste liquor does not exceed 1.4 grain per gallon.—London Mining Journal.

THIS is the Buffalo *Engineer's* recipe for transmuting metals into gold: "Take (1) cold-drawn seamless tubing, (2) tool-steel bearings, (3) hollow rolls of rubber, (4) piano wire, (5) second growth hickory. Make them into a $22 bicycle and sell it for $100.

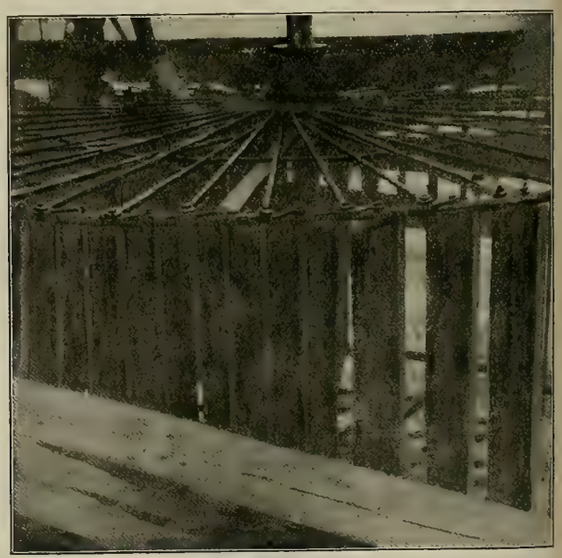




Chain Bucket Dredge.

The outline illustrations of the dredge boat shown herewith will be of interest to those contemplating the use of such apparatus. This, covering many of the demands of the Alaska-Yukon gold fields, is especially designed for prospecting along rivers, and is made by the Jeffrey Manufacturing Company, Columbus, Ohio. The equipment, ready for work, consists of an elevator, engine and stern wheel drive, with the driving connections for transmitting the power. There are two styles of elevators principally used for dredging purposes, the heavier outfit consisting of a heavy iron ladder frame, with two strands of Jeffrey roller chain and special buckets at intervals of 3 or 4 feet. The elevator is usually equipped with a steam hoisting arrangement for elevating and lowering to suit the different depths of the water, also for drawing it out of the way when its services are not required. The buckets for the heavier outfit are arranged with truck wheels at each end, the latter traveling on a suitable track forming a part of the ladder frame, thus supporting both the loaded and empty buckets and reducing the friction, wear and power consumed. The lighter style of elevator is intended for light service and consists of a wooden ladder with suitable rods and braces for carrying the chain attached firmly to the buckets by means of steel plate attachments, both the loaded and return chains being supported on idler sprocket wheels, a simple and economical construction, adapted to light work and smaller capacities. Occasionally the buckets are provided with teeth to assist in digging. In all cases the Jeffrey roller chain is used. The Jeffrey Manufacturing Company will build parts for dredges, buckets, ladder frames, etc., to suit special conditions and the views of the purchaser, to be operated either by hand or steam power. The power for the operation of this machinery usually consists of an engine and boiler, but any other power can be used, such as electricity, gas, oil, also horse power, if no other is available. Each boat is usually equipped with a chain drive to the stern wheel, which is claimed to be the simplest and cheapest for this purpose. Inquiries from interested parties are solicited and will receive prompt attention. Address The Jeffrey Manufacturing Company, at Columbus, Ohio, or any of its branches.





A New Current Water Wheel.

A new current water wheel, for placer mining and irrigation purposes in the West, is manufactured by the Western Current Water Wheel Co. of Pueblo, Colo.

The wheel is built entirely of steel, and in its construction the turbine principle has been closely adhered to. It works submerged in the water, and the head pressure due to the velocity of the current is held above the wheel. This company claim that they have obtained as high as 85% of the energy of the water. R. C. Osgood of Drummond, Mont., has had in operation one of these wheels since September, 1896. It is used to raise water for placer mining, and its installation presents many unique features.

Herewith appear two illustrations, made from photographs taken at the placing of this plant. On account of the extensive rise and fall of water, the wheel is placed between screws and the power is transmitted by wire rope 300 feet to the two pumps on the shore. The plant is securely anchored to the bank by wire cables, connected to the wheel frame. The wheel is 12x8 and weighs 1800 pounds. It is operated under a 3½-foot head pressure, and, the manufacturers say, furnishes sufficient power to elevate 2000 gallons of water per minute a vertical height of 200 feet. One of the pumps is connected direct to the giant when the mine is in operation, which discharges the water under a pressure of eighty pounds to the square inch. At night the flow from both pumps is turned into a reservoir, and the water thus accumulated, together with that pumped during the day, gives about 500 inches for twelve hours' work. In rivers of low velocity these wheels are placed between cribs, the size of the crib determining the head pressure. In case the bed of the river is sand, piles are driven, so as to outline the cribs, the top of the piles bound together and the intervening space between lines of piling filled with stone. It is claimed by this company that these wheels may be installed at a fraction of the cost of a steam plant of like efficiency, besides doing away with the expense of fuel.

Mining Summary.

CALIFORNIA.

Amador.

Petitions have been filed in the Circuit Court by R. M. Yardley of Philadelphia asking authority to make sale of the Bunker Hill and Mayflower mines at Amador City.

At the Baliol mine a rich streak of quartz was struck in an upraise in tunnel No. 1. The vein is 40 feet wide and prospects well throughout.

The shaft at the Pocahontas mine, Drytown, is down 600 feet in ore. It is the intention to erect a mill after sinking 1000 feet.

The new three-compartment shaft of the Wildman mine is under way.

At the South Spring Hill work is going on in new developments. Drifting is in progress on the 1200 level.

Record: At the Central Eureka, on the 500 level, crosscutting shows ore assaying from $4 to $7 a ton. They are also crosscutting in the 800 level. The shaft is down 850 feet.

In the Columbia, at Plymouth, the water is out, and new pumping machinery will be placed before commencing to sink.

Work on the Lincoln mine, at Sutter Creek, says the *Record*, begins next week. The shaft is already drained to the 500 level, so there will be but 300 feet of water to handle to reach the bottom.

Dispatch: Rain is still needed to enable many of the mills and placer mines in the surrounding country to operate.

The Amelia shaft is down 450 feet, and the rock continues hard.

Work is progressing in the Anita. It is the intention to sink to the 1000-foot mark before further drifting is done.

Butte.

Green & Lodge are running a tunnel on their G. K. mine near Merrimac.

On the Richelieu mine, at Buchanan Hill, a new tunnel is being driven to tap the channel at a point far below the old works. Some overflow gravel is being encountered and the channel will be tapped soon. C. Waldeyer is Supt.

E. J. Murray shipped 4000 pounds of sulphurets valued at $1500 from the Crystal Peak mine, near Enterprise.

Calaveras.

(Special Correspondence).—F. McNear is sinking on the Heinsdorff and drifting on the Red Gold. In the latter he has a vein 18 inches wide of ribbon quartz that shows free gold. Mill tests give an average of $12 to the ton.

D. McDonald has opened up the old Keystone and is taking out good ore. D. H. Roberts has struck very rich ore in the Calaveras Cave mine. Placer mining is hung up waiting for rain.

Murphys, Feb. 21st, '98.

Prospect: The Lone Star, at Douglas Flat, is again running, with plenty gravel in sight and something over 400 carloads on the dump.

The Texas M. Co., after sinking to 105 feet, have uncovered gravel which gives a good prospect to every pan.

The Ohio M. Co., after a month's lay-off for lack of water, have resumed operations, and, according to the *Prospect*, made a clean-up that is very satisfactory.

Del Norte.

The work of reopening the Low Divide copper mines still goes on, preparatory to an examination for the Iron Mountain Co.

Record: In the Big Flat country the weather is cold, with but little snow. The Jones Creek Co. has plenty of water and is piping night and day. The company is finding coarser gold than formerly. The Mains claim is being worked with fair returns.

El Dorado.

(Special Correspondence).—The Spreckels & Mulkey gravel mine at Fairplay, though a paying property, will be closed temporarily pending the return of Mr. Mulkey, who starts for Alaska May 10th in the interest of himself and A. D. Spreckels. Mr. Mulkey will prospect the Kotzebue Sound country.

I have it from reliable authority that one of the St. Louis principals interested in the Pocahontas bond, near El Dorado, says he will not expend any more money on the property. A new 10-stamp mill and compressor were erected on the property, the shaft straightened and retimbered to 400 feet. Some stoping was done and the ore from the stopes only was crushed. Practically, very little new work was done, and no additional sinking has been commenced. The reasons for discontinuing the work have not been made public. The machinery is under attachment and liens. The property is adjudged by practical miners to be of merit, and it is to be regretted that work has been discontinued at the present stage.

The Boulder mine, near Shingle Springs, is proving itself a veritable bonanza. The deeper the work, the better, comparatively speaking, are the ore returns. A 10-stamp mill is in constant operation, and a yield of $300 per day is certainly an excellent product.

Placerville, Feb. 21st, '98.

Harlow & Moherter are pushing development on the Van and Modoc claims.

The Georgetown *Gazette* says that parties are working the old Whiteside, one and a half miles below town. The California Water Co. has a placer patent to the ground, though quartz was known to exist there before the patent was applied for. Scherrer Bros. & Cheek located the quartz and are doing development work.

Nugget: Arrangements have been made to open up the Barnes & Eureka mine on the Greenstone, owned by Robinson & Berry, on the 1st of April.

Kern.

The Wedge people have sent fifty tons ore to the new mill at Johannesburg. The ore is high grade.

A new 10-stamp mill has gone to the Slate range, ninety miles from Mojave and forty from Randsburg, for the Meredith mine. The mine shows a ledge 7 feet in thickness, and part of it is rich, all paying for milling.

The Yellow Aster Co. had 136 men on its payroll last month.

Lassen.

(Special Correspondence.)—The Buckskin has been leased, and work will be commenced soon through the old McBride shaft.

The Hayseed shaft has been completed to a depth of 280 feet and drifting commenced. The vein will be encountered, it is thought, at about 60 feet from the shaft.

J. W. Arnett recently struck a body of ore in the tunnel on the Independent. The claim joins the Evening Star.

Hayden Hill, Feb. 19th, '98.

Mariposa.

(Special Correspondence).—The new mill at the Virginia is completed and will commence regular operations during the present week. Sinking is in progress below the 400 level, where power drills have replaced hand work, and drifting is in progress on all the levels. Development work is resulting so satisfactorily that it is announced the owners contemplate the addition of twenty more stamps to the present mill.

The Louisiana property, which has been closed for about two weeks, has been leased for a term of fifteen months to Doty, Ten Eyck & Pascoe, all of whom were connected with the property when run by the owners. The mill will be started up and considerable exploration work done.

It is reported that the Bondurant tunnel has at last cut the vein at a distance of 850 feet from the mouth of the tunnel and 800 feet vertically below the old workings at the 400 level.

At the Mary Harrison sinking is in progress in the main shaft and at the same time the shaft above the 175 level is being widened from two compartments to three. Drifting is in progress on the 500 and 600 levels.

The Red Banks properties are entirely idle. Very little work has been done since the strike in the Crown Lead vein last December. It is understood nothing more will be done for some months, pending the maturity of the outstanding bonds.

The Tyro is reported as about to reopen. As soon as water can be taken from the shaft sinking will be continued below the 700 level.

Mariposa, Feb. 22nd, '98.

Mono.

The new hoisting works on the Addenda at Bodie are nearly finished. As soon as completed work will be resumed in the mine.

On account of the scarcity of water the Jackson & Lakeview mill will close down. All but five men have been laid off from the mine, and it will probably be two months before they will be put on again.

The Goleta Co. is having a test made of six tons of ore.

Napa.

For the quarter to March 1st the Napa Con. Quicksilver Co. earned $32,212, against $19,161 last year, and surplus after dividends of $12,212, againt $9161 last year. Ætna earned net $12,766 for the quarter ending Feb. 1, and surplus after dividends of $2766.

Nevada.

The shaft at the Providence is down 1950 feet, and sinking will be continued to 2000 feet. A level has been cut at 1930 feet; drifts will be run both ways. Good quartz is being taken out.

The Colfax *Sentinel* says that the Red Dog Co. at You Bet have run an incline 200 feet with a perpendicular depth of 120 feet at the lower landing. From this point a bedrock tunnel of 480 feet was run. Three upraises were made. The second at the 200-foot mark struck gravel at 59 feet. At upraise three, made in the tunnel at 460 feet, gravel was encountered in 16 feet. A prospect tunnel has been started north in the gravel and is in 75 feet. R. E. Linder is Supt.

The dam in process of construction in Greenhorn canyon, one-half mile below You Bet station, by the Red Dog Co., is completed to a height of 39 feet. Its present width across the canyon is 75 feet, and, when completed, will be 150 feet across the top of the dam from bank to bank. The width of the structure is 30 feet, and it is built of massive logs crossing every 4 feet fastened to each other with iron bolts. The main stringers crossing the canyon are fastened in the rock with iron bolts. Rock ballast is filled in as often as a layer of logs is put on. The dam and right of way will cost $3000.

The *Union* reports that within a short time the Spenceville Paint and Copper Works will be in operation again.

The Supreme Court has reversed the decision of the Superior Court of Nevada county in the case of Smith vs. Hawkins. The case is important, as it involves the right to divert water from Wolf creek at the Omaha mine. John Ross, in the early sixties, built a dam and ditch through which water was from time to time diverted and sold to the Horse Shoe Co. Since the litigation commenced, the Allison Ranch Co. extended and enlarged the ditch and derived power to run the mine principally therefrom. The case has been twice tried. Plaintiff sued for 1100 inches of water and got judgment for 289. The case was appealed to the Supreme Court, which reversed the judgment because the ditch had not been used for five years, appellant holding that the right to the ditch and water was lost. On the trial it was shown that during the five years before the suit the Horse Shoe Co. had on three different occasions turned sufficient water on the wheel at the mine to work it. Judge Caldwell held this to be a beneficial use of the water and to save the right from forfeiture.

The *Telegraph*, quoting Supt. Zeitler, who is interested in several mining ventures in the county, says that the Champion is looking better than ever, and they are keeping the shaft going down. In another year, he says, the Champion will be the deepest mine in the county.

Transcript: Five stamps are running at the Chapman Ranch mine on rock of good grade. When the new 30 H. P. electric motor arrives the owners of the mine will increase the number of stamps to twenty.

At the Stanford, bonded to J. H. Neff and others, the shaft is being sunk another 100 feet.

Transcript: The Debris Commission has granted a permit to the Red Dog M. Co. to work its mine at Red Dog. The company has completed its dam in Greenhorn creek and will begin operations at once.

The Brunswick is clear of water and all the miners have gone to work. Rapid work will now be done in taking out ore.

Telegraph: The Wisconsin from forty-two tons of ore made a clean-up of $15 per ton.

Placer.

(Special Correspondence).—Local capitalists have incorporated to operate extensively on Iowa Hill. The company will be known as the Jupiter Consolidated. The directors are R. F. Rooney, T. J. Nichols, C. A. Wickman, W. S. Graham, B. B. Deming. C. A. Wickman (Auburn P. O.) will be Supt.

The property comprises 1¼ mile of channel and is situated one mile east of the present workings of the Morning Star mine. Work will be started within thirty days.

Auburn, Feb. 22nd, '98.

The miners are crying for rain and snow.

Work was resumed last week at the Evening Star on the Heenan ranch, Rock Creek district.

Senator Chapman, who recently purchased the Golden Rule, has commenced work on the property.

Another strike is reported in Ophir district by the Waugh brothers, on the Houchin property.

Brye & Lozano are taking out specimen quartz from their mine in Ophir district.

The statement issued by the Boston office of the Pioneer G. M. Co. for January shows as follows for January and December: Tons rock crushed, 721, 780; value gold bars, $8364, $11,461; payroll, 4169, 4103; bills, $1048, $1518; total expense, $5217, $5621; net earnings, $3147, $5839; average value of rock, $11.60, $14.70; men employed, 49, 49.

Having an abundance of water now and their restraining dam finished, hydraulicking was commenced at Lost Camp mine, near Blue Canyon, at the beginning of last week.

The tunnel in the Azalea mine is nearing the 700-foot mark.

Sentinel: The Herman quartz mine, near Westville, will place a pump and machinery for sinking. The 10-stamp mill is working to its full capacity. The lower tunnel strikes the ledge 400 feet below the present works.

Plumas.

Bulletin: Beach & Co. will resume work as soon as spring opens, in the Elizabethtown Channel mine near Quincy.

Independent: An upraise is being made in the Green Mountain mine at Crescent Mills from drift No. 5 to drift No. 4, a distance of 400 feet, following a body of ore which is heavily mineralized. This upraise will be 6x13 feet in the clear of timber and ladder way.

San Bernardino.

A deed was filed February 13th wherein J. A. Comer, K. A. Comer, J. K. Hawk, A. Hawk, G. H. Parker, D. Gillelen and G. Borden convey to G. W. Brown a one-eighth interest in thirty-two borax placer mines, for a consideration of $268,800. The mines embrace a territory of 4480 acres, and are located in the Brier mining district, Salt Lake valley.

The work of construction now on the new line of railroad from Daggett to the borax mines, twenty-six miles away, is being pushed rapidly. The borax works are shipping forty tons per day and the road is a necessity. A 32-mule train is at present hauling the product of the mines to the railroad.

San Diego.

The North Star mine at Julian suspended operations for the present and made a satisfactory cleanup. The owner is erecting a mill and after its completion will resume operations.

San Luis Obispo.

A San Luis Obispo paper states that three men have located the quicksilver mines which were worked years ago by A. Blochman & Co., and will put in a small retort for the present; but within sixty days will put in a retort costing $1000, and of a new patent, which prevents the quicksilver from evaporating and passing off with the smoke.

Shasta.

Paige, Small & Russell have been taking good ore from the old Lucas mine near Shasta. The ore shows galena sulphurets.

Hitchcock & Hudson struck a 3-foot vein in the Electric Light, near Shasta, which assays from $19 to $100. They have fifteen tons of high grade ore on the dump.

Collins & Blagraves took out $20,000, on a lease, from the old Washington, above French Gulch. The Washington is the pioneer quartz mine of northern California.

The Niagara has suspended operations for a time.

At the Milkmaid twenty-five men are employed. The 4-stamp mill crushed 350 tons last month.

Work is being pushed on the tunnel at the old Bell mine, at Sunny Hill. It is in over 200 feet.

The Mt. Shasta mine is employing fifteen men. They are taking ore from the north and south drifts. It is sacked and shipped to Keswick.

The Mammoth reports a strike made in a tunnel, which is in 148 feet, of a deposit of native copper. The Mammoth is a group of twenty-two claims, situated a few miles west of Kennett.

Saeltzer, Jaegel & Kahny, owners of the Mammoth group of mines on Little Backbone creek, have bonded the property to W. Forstner of New York City. A drift has been run for 200 feet, in which some good ore was encountered. The ore carries a fair percentage of copper.

The timbers in the tunnels and air shaft at the Minnesota mine have been repaired. The mill will shortly resume.

Free Press: The Three Sisters mine, near French Gulch, is producing a good grade of ore. The property was recently bonded by Ellery Bros. to Howell & Motherwell of San Francisco.

Sierra.

(Special Correspondence).—The South Fork Co. has finally come into a large body of good pay gravel and is bringing through the long tunnel with steam engine and a train of ten cars. The weather is moderating, and the company expects soon to have sufficient water for a continued washing. The dumping basin is large, in keeping with the workings of the company, which has carried on operations systematically and on a large scale.

Forest, Feb. 21st, '98.

Messenger: Kimball and others, a short distance from Goodyear Bar, struck good gravel. From ninety-two carloads of dirt $1050 was realized, over $11 a load.

Siskiyou.

At the King Solomon mine, four miles from Cecilville, twenty men keep an 8-stamp mill running day and night, crushing twenty-five tons per day. F. W. Fletcher of San Francisco is Gen. Mgr.

The miners all along the river gulches are still complaining of shortage of water. This season thus far has proved to them very unprofitable.

Ball, Travers & Johnson are mining on Six Mile creek and accomplishing rapid development work.

G. J. Main is opening a river claim on the Klamath, in the Ash creek section.

Trinity.

On the Bloss & McCleary hydraulic mine, Trinity Center, a cut 2400 feet long and 5 feet deep has been made for a tail-race. This, when completed, will be from 18 to 25 feet deep. Two hundred sluice boxes will be put in the cut.

Journal: The first payment has been made on the Chloride group at Canyon Creek and the new company has taken possession.

The Jim Fizz mine is running with a good supply of water and getting off a large amount of gravel.

The La Grange has a force at work, and in six weeks they will have their large tunnel completed and have water the year round.

Tulare.

Twelve tons of rock from the Talc mine at White River milled $9 to the ton.

The Portuguese mine at Kernville will be worked by M. Orton and 100-foot shafts sunk.

Tuolumne.

The Santa Ysabel is still without water to run the mill in full. Ten, fifteen or twenty stamps are worked, according to the water supply; the company is earning all expenses, including those for development, and is out of debt, with a treasury surplus of about $10,000.

The *Independent* says that the Columbus is systematically developing the property and a mill is soon to be erected.

The Keltz is running its 15-stamp mill. Last week a large body of sulphuret ore was struck.

The Tom Evans and Hazel Dell group has been reopened and the tunnels cleaned out.

San Francisco people have unwatered the Perrau mine at Soulsbyville and are developing it.

Magnet: The No. 2 shaft at the Trio is down 330 feet and prospects continue encouraging. In No. 1 shaft they are drifting on the Trio and Mooney veins.

The Bonanza, near Sonora, expects to be working a full force at once, as the water supply is sufficient to run the compressors. The developments hereafter will be confined strictly to the deep shaft.

At the Harriman, near Jacksonville, the new hoist is in operation.

Independent: On the Mountain Lily there are five veins, all gold bearing. This property is developed by two tunnels. The only thing needed is a mill. The ore dumps contain good ore. The mine is in readiness to stope between the two levels opened. The property has 200 inches of live water with a vertical fall of 600 feet.

At the Trio both the north and south shafts are sinking.

At the Tarantula sinking the shaft continues.

The Hancock, below Rossland, has struck a body of ore that prospects well.

The Alameda is drifting and sinking. Good milling ore is coming to the top.

At the Jumper the electric plant was started last week, running the compressor. Four power drills are in operation.

The Rappahannock's shaft is 750 feet and will be continued until the 1000-foot level is reached.

At the Dutch mine the mill is running full capacity. Drifting, stoping and sinking are progressing.

The Grizzly mine is crosscutting and sinking.

The Dead Horse is contemplating sinking the shaft to further depth. The mill is running day and night.

Democrat: The main shaft in the Tanzy has reached 180 feet.

Ventura.

The Ventura *Journal* says that work is be-

ing done on Sulphur mountain for the delivery of thirty tons of crude sulphur daily from the sulphur beds, nine miles from Ventura. The one now being uncovered is 60 by 240 feet, and there are several other beds, one much larger.

NEVADA.

The De Lamar Co. made another successful cave-in in their mine last week. The blast dropped a body of ore estimated to contain 20,000 tons, a distance of 15 feet from the surface to the stope. The ore dropped has been standing for some time between the old workings and surface. This is a new departure in mining by caving, and the De Lamar Co. so far has made a success of it.

The ore in the Standard at Mountain City is a carbonate carrying gold. The early prospectors looked for horn silver and chlorides. In one pile of 100 tons on the dump of this mine, the lowest assay, the owners claim, was $68 in gold and $3 in silver.

The Star mine at Cherry Creek is running sixty tons of crude ore daily, productive of from ten to twelve tons of concentrates.

The Dayton *Times* reports that Tailleur & Moore have a contract from the Isis M. Co. to complete the drain tunnel started some years ago. This new tunnel will be 300 feet long and is expected to tap the winze of rich ore above. In sinking the winze in this mine the ore paid $1000 to the foot for a depth of 60 feet. Water was then encountered and work suspended.

Two carloads of antimony were shipped from Mill City last week to Chicago.

The Wells *Herald* states that the Delano group of copper claims at Salmon has passed into the hands of an English company under a bond of $65,000. A smelter is to be erected and machinery for a hoist is on the road. Work for 100 men is assured.

The Tuscarora *Times-Review* says that the Dexter is keeping both of its mills running steadily.

On the Yuba mine and Pacific tunnel, at Pioche, the Godbes are employing forty-five men, making periodical shipments of high-grade ore, and operating a 10-stamp mill continuously.

OREGON.

C. P. Thore has bonded the hydraulic mine, at Waldo, and begun work. A. N. Ashley is Supt.

The Rocky Gulch Mining Co., at Galice creek, is paying $100 per day, but the water supply is limited and work days are scarce.

The Helena mine, at Bohemia, owned by R. J. and P. J. Jennings, will build a 10-stamp mill next month.

J. W. Cook, owner of the Musick mine, near Bohemia, proposes erecting a 30-ton smelter

At the Bonanza, near Baker City, the crosscut has reached 1200 feet. This tunnel exposes a vein 80 feet in width and the footwall has not been reached. The drills are also pushing at work in the shaft. The recent development has furnished enough water to run a hundred stamps and this is the number, says the *Democrat*, that will be put in at the Bonanza next summer. The 20-stamp mill is kept constantly at work. The ore is transported from the mine to the mill by a half-mile tramway, which, at the completion of the new 3000-foot tunnel, will be supplanted by an electric railway.

Men are bailing the winze in the Robbins-Elkhorn mine, near Baker City, preparatory to an examination by Eastern people.

The Baisley-Elkhorn shaft is down 110 feet below the lower drift and the ledge has been crosscut and drifts started north and south. As soon as the stopes can be opened the mill will start for a continuous run.

A mill is to be erected at once on the Rachel, four miles east of Baker City, of which J. Wallace is Supt. The capacity of the mill has not been decided upon, but it will be of ten or twenty stamps.

J. Hughes has bonded the Badger property in Grant county to San Francisco parties. They are proceeding with development work.

Republican: Bradbury Bros., owners of the Gordon mine, Baker City, have struck water at a depth of 87 feet, to be utilized in a stamp mill. The Gordon has a good body of ore exposed, and the only question was a supply of water. This having been solved assures the erection of a 10-stamp mill.

Tidings: A large dyke between Wagner creek and Arastra gulch, and from 400 to 600 feet in width, has been discovered near Ashland. As far as prospected and assayed it runs from $2.50 to $28 per ton, carrying cinnabar and silver.

Garvin & Co. are working the old Pilgrim mine near Ashland. A crosscut tunnel that will tap the ledge at a depth of 150 feet is being driven and will be in by the first day of April. If the ore is as rich at tunnel level as on top reduction works will be put on this summer.

One hundred tons of ore from the Ashland mine are being brought to the Hicks mill for reduction.

The Rocky Gulch mine turned out $400 in gold last week, the result of a few days' run and a limited water supply.

W. G. Ingels, who bonded the Alford quartz ledge on Galice creek, Ashland, is driving a tunnel to tap the ledge about 100 feet below the surface. Should the ledge continue to show up as well as it has been doing a 5-stamp mill will be put upon the property.

WASHINGTON.

The Echo, near Pierre lake, on the Colville reservation, is reported to have tapped a strong lead of shipping ore in the crosscut tunnel, which is in over 70 feet.

The M. R. C. Co. of Bossburg shipped 500 pounds of ore from its claim on Bruce creek to the smelter last week. The ore has been running about $60 per ton on assays.

O. J. Collins of Bossburg says there are 200 men at work near Bossburg this winter. In Stevens county and on the Colville reservation fully 2000 claims are being worked and all are showing well.

The Bossburg *Journal* says that scores of prospective townsites on the reservation are staked and held as mineral claims, and all the enterprising locators think they have the foundation for a second Butte.

Work has begun on the tunnel on the Q. S. claim near Loomis. The tunnel will be pushed to crosscut the ledge. It will require 300 feet to tap the ledge at a depth of 600 feet.

The Republic mine, at Republic, which struck good values at a depth of from 50 to 150 feet, was low grade on the surface. Now the men are cutting through an ore chute which is said to give sample returns of from $100 to $300 to the ton.

On the San Poil, near Republic, eleven men are working. The ore body is from 7 to 8 feet wide.

On the Little Cove, near Republic, J. Bourne, Jr., has 17 feet of ore on the surface. The claim is developed with a 140-foot shaft and a drift at the 125-foot level. The Mountain Lion is another claim owned by Mr. Bourne. On this he is running a 700-foot level to tap the vein at 500 feet.

The United States Marble Co., operating the onyx and marble quarries near Valley station, has opened up a body of onyx for a distance of 50 feet into the bluff showing all the tints of the rainbow.

The Niagara shipped fifteen tons of ore.

The tunnel on the California is 100 feet and driving to crosscut one vein at a distance of 225 feet and a second 300 feet. There are two shafts, one to a depth of 25 and the other 40 feet. The mine is two and a half miles from Northport.

BRITISH COLUMBIA.

The Minnehaha mine, in the Cariboo camp, Yale district, will shortly erect a stamp mill and air compressor drills. Ainsley McGraw is Mgr.

Donald McKay of Fort Steele proposes buying a 20-stamp mill.

The St. Eugene mine, in the Fort Steele district, is to build a 300-ton concentrator next month.

O. Johnson has given a $30,000 option on four claims near Rossland. On one of these there is a 22-foot quartz lead, giving assay values as high as $28 in gold and an average surface assay of $8.

Six hundred and fifty-four tons of ore were shipped last week from Kaslo.

The Black Eagle, near Rossland, was sold to the B. A. Corporation for $10,000.

News comes from the north, says the Spokane *Review*, that the Omaha & Grant Smelter Co. has suspended operations in the Kootenays and closed all plants in which it is interested. The motive is not known and the action of the company occasions surprise, as their operations were considered profitable. They have been running the concentrator at Pilot Bay and the reports have been that plenty of ore was handled and that the smelter might be expected to blow in any time. The expected blowing in has long been promised but never materialized. The concentrator was closed down this week. The company has been operating the Lucky Jim mine in the Slocan, and this has been shut down and the men discharged. The Tariff mine in Ainsworth camp, also owned by the Omaha & Grant people, has been producing a high-grade galena ore. The pumps were drawn last Wednesday and the mine is filling with water.

THE KLONDIKE.

C. Green, who has just returned from the Copper river, says that the Indians on Copper river do not bring down great chunks of native copper, and if there is gold on the upper waters of that stream, it is yet to be discovered in paying quantities. "I made careful inquiry of mining men, trappers, traders and Indians, and am thoroughly convinced that there is little to the fairy stories which have been told about that country.

"The Stick Indians come down the river to trade at the stores around the mouth of the river. They are friendly, and want the white men to come into their country. They have copper ornaments, but they bought the metal from traders. White men who have prospected up the river report that they found a little fine gold, but not in paying quantities.

"About 150 men have been wintering around the mouth of the river, waiting for the ice to form so that they could go up the stream. Half of those are returning, having sold their supplies at a sacrifice. The others are struggling up the stream against tremendous obstacles. Each man has from three to five sleds, each loaded, on the average, with 300 pounds of supplies. These they are pulling laboriously up the river on the ice. There is about 18 inches of slushy snow, and it is necessary for men to go ahead on snowshoes and break a path for the sleds. Only a few miles can be made by a day's hard work. The method is to pull one sled a few miles, leave it and return for another, repeating this until all the sleds have been brought to that point.

"Copper river flows into Prince William sound. The delta is forty miles across at the mouth, and the country there is a vast mud flat. It is impossible for vessels to land at the mouth of the river. The chief landing place is at Orca, on Prince William sound, forty miles from Copper river, and from that point you make your way across to Alganak, on Copper river.

"It is seventy miles from the mouth of the river up to the glacier. Beyond that little is known of the country. The Stick Indians come down to traffic, but they say they know nothing of mineral up the stream. About a year ago two white men, Duval and Donahue, went up the river about 200 miles, but they found only a few fine colors.

"A party of 100 men are now at Valdease, north of Orca, at the extreme head of Prince William sound. Their scheme is to cross the heavy glacier which runs along the coast for a great distance, through which the Copper river has cut a channel. They hope in this way to strike the Copper river 170 miles from its mouth. This glacier is thirty miles across. It is a visionary scheme. Hardy and experienced men, traveling light, have tried it and failed. They were turned back by great cracks in the glacier, from 50 to 150 feet wide.

"The great majority of the men going to Alaska have no more idea than the man in the moon of the hardships they are running up against."

Three steamers sailed from San Francisco this week crowded with men and supplies for the Klondike via Dyea and Skaguay. No steamers or sailing vessels have been reported lost or foundered since the wreck of the Clara Nevada. Regarding the ruling of the Treasury Department in relation to the transportation of goods across American territory and en route for Klondike published last week, their essence is that a man reaching Dyea or Skaguay with Canadian-bought goods must either pay brokers' fees and cost of a bond, or deposit money sufficient to cover the same at the port of entry, and then upon arriving at the British line he must send back his release of the bond or a certificate in order to get his money back, or pay $6 a day for an escort through American territory.

Late Skaguay arrivals tell of a blockade of the Dyea trail by miners and packers, who resisted a detachment of United States infantry when the soldiers claimed the right to go over the trail before them.

Stewart Menzies, the Alaska Commercial Co.'s agent at Forty-Mile, Alaska, arrived in San Francisco last Sunday direct from Dawson. He and his party of five, with a boy five years of age, left Dawson January 20th, way over the Skaguay trail, arriving at Skaguay February 10th. He brought a sample of gold, worth $65, which he took from one bucket of dirt from Claim 18 on El Dorado creek, in which Rudolph Neumann owns one-fourth. Speaking of his trip and the recent discoveries in the now famous gold fields, he says no important discoveries have recently been made near Dawson, though rumors of rich strikes were frequent. Henderson creek and the Stewart river district give promise of becoming good camps. "We found between 300 and 400 men wintering there when we passed on our trip to the coast. Nearly all the recent discoveries of any value have been made on American territory. We had a stampede lately to American creek, fifty miles below Forty-Mile. The claims there are summer diggings. They are shallow, from 3 to 4 feet deep. The miners sluice the top of the ground and take out from $5 to $20 in dust to the pan. Chicken creek, Napoleon creek, Davis creek and Walker's Fork, all on American territory, show good prospects. These are tributaries to Forty-Mile creek. Chicken creek prospects yield $9 to the pan in average. Miller and Glacier creeks are tributaries to Sixty-Mile. They are old creeks, having been discovered in 1887, but still show good paying gravel. I had a letter from two friends of mine the day before I left for the coast, who are working their claim on Glacier, informing me that they take out $100 a day.

"I met Major Walsh, Commissioner for the Yukon country, Febuary 3rd. He said that he would have 40,000 pounds of provisions in Dawson as soon as the ice in the river broke up. He intends to open a trail and was on his way to Dawson to make arrangements, so that he could establish the Dalton trail on his return and keep it open and protected by mounted police. There is no longer any danger of famine at Dawson."

According to local reports, J. C. K. Van Ee, who bought the Royal mine at Copperopolis, Cal., for $400,000, which was reported in this paper Dec. 4, '97, bought four placer claims in the Klondike last week for $240,000—92, 93, 95 and 82, located on Bonanza creek "above Discovery." The first three were bought from Barnes and Dobson and claim 82 from T. B. Straven, all of Dawson. None of them have reached the bedrock. There is a demand for such property in London.

Every ship and craft returning from Skaguay and Dyea brings back would-be Klondikers who, discouraged and disheartened by finding their gauzy day-dreams vanish on the first encounter with the ice and snow of an almost arctic winter, have turned again to civilization, sadder but wiser men. It is from these people that the true conditions are learned.

There are hundreds of people in Dyea and Skaguay out of work, out of money and every day growing more desperate. Notwithstanding the fact that every vessel leaving for Alaska is loaded with every pound of freight the law will permit her to carry, hay in Skaguay and Dyea is selling for from $60 to $80 per ton, lumber from $40 to $50 per M., fresh meat 40 cents per pound and other things in proportion. There are thousands already there who, finding it impossible to proceed, have not money to return nor the means of procuring a livelihood. Most of those who have gone over the passes this winter are camping on the other side, awaiting the spring break-up, which will be about April 1st. Recent reports also chronicle the prevalence of sickness.

IDAHO.

In the Warren and Florence camps eighteen new mills are to be built this summer.

The Golden Star, at Hailey, is taking out twenty-five tons of ore a day. H. Allen is Supt. The company contemplates building a 20-stamp mill.

There are 1500 men employed in the mines of the South Fork district, near Wallace. The daily pay-roll coming direct from the mine owners is not short of $7500. The mine owners' pocket dividends amount to about the same sum. The product this year will, it is estimated, exceed $15,000,000, of which one-third will be dividends.

There is more ice in Snake river than there has been for many years past, and all mining operations have stopped from American Falls to Weiser.

The clean-up in the DeLamar mill, at DeLamar, following the tearing out of the old pans and settlers and gathering up the waste and losses of many years run is estimated to yield $20,000.

The *Nugget* says the total output of the DeLamar mines since in the hands of the present Co. has been in excess of six million dollars. To this may be added the million or more taken out by Capt. DeLamar.

Five bricks of gold and silver came from the Cumberland mine near Silver City. Four are largely silver, but have enough gold to make them worth $3 per ounce. The fifth is mostly gold and is valued at $12 per ounce. The metal was the product of a test run of twenty tons of ore through an arrastra.

Five additional stamps are to be purchased for the Idaho Con. G. M. Co. at Warren.

F. R. Culbertson, Mgr. of the Con. Tiger & Poorman Co., in his report shows that during the ten months the property was operated 91,089 tons of ore were mined, which produced 15,819 tons of concentrates, worth $431,879.87 above freight and smelting charges. The expenses of the year, including about $15,000 for new machinery, were $292,835.78, leaving a net profit of $139,044.09, or over $15,000 per month, exclusive of additions to the plant. The Tiger-Poorman pumps 3000 gallons of water per minute, which together with the crude ore, was all hoisted 1200 feet or more, and the water was steadily pumped for the two months before the mill was ready to run, making it the most expensive to operate of all the Cœur d'Alene mines.

The Morning and You Like mines have 279 men on the payroll. Improvements will be made in the spring, requiring an increase.

At the Lucky Boy, Custer City, ten stamps are dropping, and twenty-seven tons daily are put through the mill, which is steadily turning out gold and silver bullion. There are sixty men on the pay-roll, with assurance that this number will be doubled the present season. The company now has under consideration the erection of an auxiliary plant with which to cyanide the tailings.

UTAH.

A company is being formed, says the Bingham *Bulletin*, to operate the leaching plant lately started by the Fred Mueller Co.

The Daly Mining Co. during the past year marketed ore and bullion of the value of $171,471.71, distributed a dividend in the sum of $37,500 and closed with a cash balance amounting to $36,199.37.

The La Cigale incline at Mercur is down 540 feet, where the vein has widened to 21 feet.

The Grand Central, of Tintic, shipped four cars of ore of a net value of $40 a ton. This makes a total of twelve cars in the last ten days.

The Eureka Hill is reported to have marketed 1,000,000 ounces of silver in 1897.

A shipment of gold cyanides of the value of $20,000, was made by the Mercur last week.

Tribune: The tunnel on the Herschel mine in Mercur has been driven 2200 feet and is still pushing ahead. The ground is getting softer and the cost does not exceed $7.50 per foot.

Two strikes were made in the Mammoth last week in the Finn tunnel and in the extreme north workings of the 700-foot level.

The Betsy stope, from which ore of the value of about $1,000,000 has been taken, caved three years ago, and since that time the ground has been permitted to lie idle. A short time ago Supt. Earls decided to extend the tunnel farther north in the Golden King claim. The breast of the tunnel was then about 280 feet north of the Betsy stope, and, pushing on 20 feet farther, a shot uncovered ore that in the furnace showed two ounces gold, forty ounces silver and 30 per cent copper, or a valuation of over $110 per ton.

The latest discovery in the Red Wing, at Bingham, exposed a foot of ore assaying 13 per cent copper, thirty-two ounces silver and $3.60 in gold.

During the past year the concentrator of the Eureka Hill Co. put through 60,000 tons of ore, while 2000 tons of crude ore were sent to the smelter. From 85 to 90 per cent of the values consisted of silver, while the remainder was about equally divided between gold and lead.

The Flush mine, Granite mountain, made its first shipment, netting, after wheeling it by wagon 105 miles, $35 per ton. The ore contained 70 per cent lead in addition to fair values in gold and silver.

The Niagara Co. shipped six cars of ore from the Spanish mine at Bingham. The lot showed 38 per cent lead in addition to small amounts of silver and gold.

A carload of ore from the West Argent, at Stockton, yielded forty ounces silver and 45 per cent lead.

Hall & Wooten have bonded the properties of the Capitol Gold & Silver M. Co., among them the Gold Blossom, near Sunshine, for $12,000. They will commence work March 10, and should it prove satisfactory, they will purchase the properties and pay therefor $12,000.

Record: The Ontario tailings dumps, at Park City, are to be worked in the Marsac mill. To run them at the rate of 100 tons a day will require about a year and a half's time.

MONTANA.

At Gilt Edge, Fergus county, the mill is handling eighty tons of ore per day. The ore is low grade, but, when worked in large quantities and under careful management, is bringing good returns. Sixty-five men are employed.

The Philipsburg *Call* says that a stamp mill is to be erected on the property controlled by D. Birran, Moose Lake district. The most important deal made in the district is that involving the copper lode, eight miles from Moose lake. It has a crosscut for a distance of 65 feet and has but one wall. Last week the property was bonded in the sum of $200,000 to Chas. Houck and others of Anaconda. While official word was not given out, it is stated with every apparent element of truthfulness that the Anaconda Copper M. Co. is the party that holds the option on the property.

A shipment of high-grade ore from the Little Giant was made from Townsend.

The board of directors of the Iron Mountain

mine in Missoula Co. announces that it has given up the mine, and, for the time being, its adjoining claims on which prospecting has been pushed. Since 1889 the property has produced $500,000 in dividends. The company proposes to develop other properties.

A vein of coal of considerable extent has been discovered on Blubber creek, in the vicinity of Augusta. Miners are at work opening it up.

The Butte at Radersburg continues to ship a car of ore every six weeks.

The Sarsfield and Eureka claims at Boulder have been bonded for $40,000 by W. L. Hardie, representing a company at Cleveland, O. Machinery will be placed on the property at once and the claims thoroughly developed.

The Gold Flint at Sylvanite has encountered between the 100 and the 150-foot levels an ore body that varies from 30 to 36 inches. It is galena, and the lowest assays have been 90 to 136 ounces of silver, 20 to 60 per cent lead and 7 to 26 ounces of gold. It averages over $100. The 20-stamp mill is turning out 60 tons per day, 90 tons of concentrates a month.

A strike of good ore is reported from the Le Roi claim at Saltese.

Pocket: A contract has been let to have the material on the ground by March 1st for another gold dredge on the Clark's Fork at Red Lodge, making the second large dredging boat on the Clark's Fork, besides the stationary steam plant operated by J. H. Bigger. The Dietrich dredge will start May 1st.

The Fortune group, six miles from Virginia City, has a shaft on the vein to a depth of 200 feet, the vein averaging 7½ feet in width. A tunnel below the shaft is run on the vein 800 feet. The ore carries gold, silver, lead and copper, the average values per ton being gold, $20; silver, $10; copper, 20 per cent, and lead, 35 per cent. There are 1000 tons of ore on the dump.

F. B. Linderman, near Sheridan, has uncovered a 12-foot vein giving an average assay of $25 to the ton in gold.

The 60 stamps of the Kennett mill are dropping on Kennett ore and the largest gold mill in the State is in operation. Two hundred tons of ore are milled daily.

The output of the Parrot for the year ending May 31, last year, was about 20,000,000 pounds of copper. The Parrot Co. owns nine claims in the vicinity of the Anaconda, Boston & Montana and Butte & Boston companies. Attention has been given only to the production of its copper. The company paid $500,000 for a new smelting plant at Gaylord out of its earnings. The capacity of the old smelter was 400 tons a day. The new smelting plant is arranged for a capacity of 800 tons daily. It is expected that the operation of the new plant will save from $100,000 to $200,000 per year by the use of water instead of steam. The refining plant at Bridgeport, Conn., which cost $500,000, has a capacity of between 3,000,000 and 4,000,000 pounds of refined copper per month. The Parrot Co. places the value of this plant on its books at $500,000, although it pays 20 per cent in dividends.

Two mining cases are on trial before the United States Court at Butte, both against the Heinze corporation, the Montana Ore Purchasing Co. One is brought by the Boston & Montana Co. for a half million dollars damages for ore alleged to have been extracted from the Pennsylvania mine through the workings of the Rarus by the defendant corporation, and the other is similar in its nature, for the sum of $150,000, brought by E. R. Morse for damages on account of the alleged extraction of ore from the Michael Devitt claim, also through the Rarus workings.

SOUTH DAKOTA.

The Hercules M. Co.'s shaft, near Deadwood, is 60 feet and still in hard trachyte.

The Golden Queen has been working on upper Deadwood gulch all winter. A ledge of ore has been opened that assays $14 per ton in gold.

Burns & Little are working on the Smoky City at Garden City. They ship six tons of ore a day, which averages $20 per ton in gold. The owners of the Harrison mine on Blacktail divide are shipping three tons a day.

The Holy Terror gold mine in the Black Hills produced $15,000 each month during 1897 from a 16-stamp mill. The surface richness did not hold out and there was a barren zone for some distance, but the company went on down in a plucky way till the 500-foot level was reached, when a big body of ore was reached from which $180,000 was taken last year.

WYOMING.

J. I. Cowan, representing H. Seton Karr, M. P., and other English investors, has bought the Charter Oak copper mine, near Grand Encampment, for $30,000. The purchasers have been operating the mine under a lease for five months. They have driven 200 feet of stope and have several thousand tons of ore on the dump.

MICHIGAN.

The Belt Group, comprising the Belt, Knowlton, Mass and Adventure mines, have been sold to A. B. Turner & Bros., Boston, for $400,000. The mines will be reopened and vigorously worked.

The annual report of the Quincy M. Co. for 1897 shows: Average force employed (men), 1066; average number of miners, 393; average wages of miners on contract per month, $52 52; yield of mineral per fathom of ground broken, 587 lbs.; yield of refined copper per fathom of ground broken, 481 lbs.; total rock mined, 632,867 tons; total rock hoisted, 568,822 tons; total stamp rock hoisted, 542,623 tons; product mineral from stamp mill, 15,429,725 lbs.; product mineral from rock houses, 5,200,900 lbs.; product refined copper, 16,924,618 lbs. The total depth of shafts sunk was 642 feet, and of winzes 925 feet, making an aggregate sinking of 1567 feet, Number of feet drifted was 11,957. Amount of ground broken, 632,867 tons.

News Bureau: It is figured that the cost of copper to Quincy M. Co. in 1897 was 6.91c per pound, compared with 6.57c in 1896, 6.38c in 1895 and 6.75 in 1894 which figures include construction charges. The company appears to have received for its copper in 1897 an average of 11.06c, 10.92c in 1896 and 10.18c in 1895.

COLORADO.

Work will be begun on the Aspen Fraction in a few days with fifteen men. Clarence Stamm has leased the property. There are 500 feet of open workings available and a good grade of ore can be mined.

G. W. Davis of Chicago has closed a deal for 2500 acres of placer ground in the South Pass district.

Returns from the last carload sent out last week from the Modoc on Bull hill show that the ore ran thirty-seven ounces in gold and twenty-nine ounces in silver.

The Kirk tunnel at Sunset is in 1200 feet, the breast of which shows an 8-inch streak of iron ore averaging $46 per ton.

Jain & Spellman sold the Homestake group, consisting of six claims and millsite, for $12,500. Work on the property begins at once.

The O. & N. at Ouray shipped seventeen carloads of ore last month.

The Portland paid its monthly dividend of $30,000 on the 15th inst., making a total of $1,327,080 paid to date. The report of the treasurer at the annual meeting showed a cash balance in the treasury of $306,956 85; the receipts for the year were $1,003,140.36; the expenditures $873,335.39; the company paid in dividends $360,000; the average net value per ton of the ore handled during the year was $52.70 against $38 per ton for the year 1896, or an increase of $14.70 per ton.

The Ruby mine, near Boulder, shipped twenty-four tons of ore, half of which is first-class. Mgr. Harrison states that $18,000 has been taken out of this mine the past six months. The smelting ore runs about $100 per ton, while the second-class brings about $50.

In the drifts and stopes from the 350-foot station on the Johnson, at Cripple Creek, the lessee has an ore chute from 8 to 15 feet wide, running from $60 to $100 per ton in carload lots.

In the Hallett & Hamburg, at Victor, in driving the drift south 50 feet from the shaft at the 300 level, a body of ore oblong in shape and about 40x50 feet in size, all of smelting grade, was encountered. A shipment of a ton of this ran better than 220 ounces. A stope in this chimney is up 30 feet, and there is no change in the grade of the ore or in its dimensions. In drifting west at the 200 and 300 levels considerable ore of a better grade than two ounces is being broken.

The Solid Muldoon, at Idaho Springs, instead of drifting from the surface, will erect a plant of machinery and the shaft sunk another 200 feet.

Mgr. Branstetter says that a plant of machinery will be placed at his Train Run property, near Idaho Springs, early in March. Compressors and air drills are to be used.

The Black Lion mine, Clear Creek county, has a good grade of mineral on both sides of the shaft, and shipments of $100 ore are being made.

During the time the Ibex Co. has had control of the Little Johnny, it has produced, as nearly as can be estimated, $8,000,000. The dividends paid will amount to $4,000,000. In the mine there are ninety miles of workings, all in ore. The ore carries gold, copper and silver in quantities, and the output shipped to the smelters is 325 tons daily. The ninety miles of underground workings are equipped and thoroughly fitted out with electric lights.

The Abe Lincoln, at Cripple Creek, has opened a body of ore in one of the old stopes above the 300-foot level, about 14 inches wide, giving an average assay of five ounces. A fifteen-ton shipment was made last week. They are lowering the water to the 350-foot level, and expect to be breaking ore at that depth in a few days.

King & Woddleton, in the 115-foot level, on the Geneva at Cripple Creek, are sinking a winze from shaft No. 2 on 3 feet of good ore, much of it showing sylvanite, from which they made a shipment this week.

J. Waters cut into 2½ feet of almost solid galena in his shaft on Gold Hill last week at a depth of 170 feet.

Henselman & Co., on Raven Hill, have sent out their second shipment, consisting of ten tons, estimated at three ounces, and have 3 feet of good grade ore in the bottom of their 40-foot shaft.

A shipment of twenty tons of $70 ore was made last week from the Pickup lease on Bull Hill.

Denver *Republican*: The Tom Boy mine, at Telluride, is employing between 100 and 200 men, and increasing its force. The Japan mine is taking out good ore and working 100 men. It takes 300 miners to operate the Smuggler-Union. It is shipping ore, and the 60-stamp mill on the property is stamping out almost 200 tons per day. The Mount Wilson M. Co., perhaps better known as the Silver Pick, is employing 125 men.

On the Meldrum tunnel, one of the greatest of its kind in the world, work was commenced about three months ago. It will require four years to complete it. The cost of driving it will be between $4,000,000 and $5,000,000. The work is being done by a Scotch company. The use of air drills has been commenced at the Telluride end. From the Telluride side the point of exit will be about half a mile above Ironton, Ouray county.

Reporter: Drifting is continued on the Mab shaft of the Big Chief and Castle View properties at Leadville.

The Bonner at Silverton has produced this winter 145 sacks of free gold ore and twenty tons of sulphide ore.

The Gilpin & Cripple Creek G. M. Co. has bought the Montgomery mine in Gilpin Co. The transfer was made last week. This is one of Gilpin's old producers. The main shaft is about 300 feet deep with 1500 feet of levels. The vein is 4 feet, with a good grade of mill dirt, and the smelting ore averages $35 per ton.

The Venture mine at Leadville is operated by the Brussels Leasing Co. A large amount of low grade milling ore has been shown up.

Denver *Record*: The quantities of pay ore found in the 800-foot level of the Portland tend to disprove the theory that the Cripple Creek ore bodies lie in porphyry basins and are cut off by the granite formation. B. B. Lawrence, the consulting engineer for the Portland Co., says that while the quantity of ore is greater in the porphyry the quality is good in the granite. The Portland has demonstrated that there is rich ore in both granite and porphyry to an indefinite depth.

The Georgetown *Courier* says that the rise on the Griffith mine is turning out $140 ore to the foot.

The Union Co., Cripple Creek, shipped 3500 pounds of high-grade ore and five tons of $40 stuff.

Victor *Record*: The Portland has been encountering some of the richest ore ever found on the property in the drifts from the sixth level. A sylvanite ore chute was opened in the lead and for many weeks yielded quantities of high-grade smelting ore.

Sixty tons of ore were sent from the Moon-Anchor last week. Another 100 tons left the property this week.

Of the last lot from the Pharmacist 2½ tons averaged 31.19 ounces; 15 tons, 4.45 ounces, and 33 tons, 1½ ounces.

A shipment from the Gold Sovereign contained ten tons of $300 ore and eight of $6.

The Lillie at Cripple Creek is outputting thirty tons per day of $60 ore.

Simmons & Mick on the Zenobia sent out sixteen tons that assay from $60 to $80.

Shipments from the Anchoria-Leland properties last week amounted to 150 tons, all smelting ore.

Anstie & Von Hemert are shipping fifty tons per week from the Mattie L.

A sale of mining property amounting to $75,000 was consummated during the week, says the Colorado Springs *Investor*, by which the Jewel claim was transferred from J. P. McCoy to the Crippon-Lawrence.

A. L. Dickerman and associates paid $85,000 into the First National Bank of Colorado Springs last week, says the *Investor*, as part of the purchase price of the Orphan Bell Co.'s properties. This makes a total of $160,000 which has been put up by the purchasing parties.

NEW MEXICO.

The Colfax M. Co. at Elizabethtown is said to have encountered a lead of ore 2 feet thick, assaying over $100 per ton.

Crawford Bros. resumed concentrating the tailings at the old Pacific mill, Silver City. They produce half a million pounds of concentrates per month.

Thirty tons of second-class ore is being hauled to the Porter mill from the Brush Heap mine, near Hillsboro, for a test preparatory to building a mill in Sawpit gulch.

The Shoshone, near Red River, is taking out good ore. The owners, Gusdorf Bros., will put in a mill in the spring.

Bruce & Wilson, doing development work on the Crown Point mine for O. P. Posey and associates in the Cochiti G. M. Co., are said to have struck a body of ore in the south drift at the 150-foot level that runs $600 in gold to the ton.

The Santa Fe *New Mexican* announces that Thomas A. Edison and an English company have closed a deal for the Ortiz grant, in South Santa Fe county. The price agreed upon is $1,500,000, payable in two years. Edison is building a plant that will handle 25,000 tons of placer dirt per day, and will make his headquarters at Santa Fe.

TEXAS.

On the lignite coal mines, three miles west of LaGrange, the vein is from 18 to 21 feet thick, and carries about 52 per cent fixed carbon and 5 per cent ash. There is a large territory underlaid by this vein. Four shafts have been sunk.

ARIZONA.

(Special Correspondence.)—At Canyon Del Oro, thirty miles north of Tucson, are the placer grounds belonging to Capt. J. D. Burgess and associates, which are being worked under lease by Messrs. Newsem and others, with water sufficient during part of the year. The gravel deposits at this point exist in banks and benches rising one above another. The work going on is testing, and results appear to warrant work on a larger scale. The future plans contemplate the building of a reservoir for water storage and putting in hydraulic works.

At Shultz, fifty miles northeast of Tucson, are in operation the Mohawk and Mammoth. The Mohawk has a double-compartment shaft 300 feet deep. The vein is reached from the 200 and 300-foot levels, connected by winzes. The underground workings are lighted by electricity and the air circulation is excellent. The ore, free-milling, is handled by a 30-stamp mill, ninety tons per day. The mill and mine are supplied with water by a steam pump and pipe line from the San Pedro river, three miles distant. The Mammoth mine, operated by the Mammoth-Collins Company, is developed by six levels from a 600-foot shaft. There are from 200 to 1200 feet of work on each level. The ledge of ore, which dips slightly, is from 6 to 40 feet wide. The vein matter is a quartzite; the company saves about 75 per cent of the values. The vein walls are granite and andesite. The ore is porous and breaks down readily. The values are said to run from $6 to $12 per ton. Some satisfactory cyanide tests have been made on this ore. The Mammoth and Mohawk are on the same vein and the ores of the two are similar. The Mammoth mill of fifty stamps is on the San Pedro river, three miles east of the mine, where the village of Mammoth has been built up. A tramway is being constructed from the mine to the mill. The latter is being overhauled and repaired. The Samaniego stage line carries daily mail from Tucson to Mammoth via Canyon Del Oro and Shultz. The U. S. Government maintains a telegraph office at Mammoth, being on a line connecting various military posts. The San Pedro, which carries considerable water at certain seasons of the year, flows into the Gila, thirty miles northwest of Mammoth.

From Mammoth sixteen miles eastward, over the pass at Table mountain, is the property of the Table Mountain Copper Co., whose fifty or sixty tents are pitched. About seventy-five men are at present employed there. Several thousand dollars have been expended by the company in making a good wagon road from the camp to a main road leading to the Southern Pacific railway at Wilcox, seventy miles distant. Machinery and supplies are brought to Table mountain by this route. This property is being developed by an open cut, the workings having the appearance of a large quarry. The face of the cut, showing a black oxide and carbonate of copper, has a vertical thickness of about 50 feet, and the surface outcroppings of the same extend 3000 feet laterally. At present the ore contains no sulphides, though no prediction can be made as to what deeper workings may result in. The ore contains silver and gold. According to tests made the copper values run from 12 to 18 per cent. On the dumps and in sight there are several thousand tons of ore which are supposed to possess good smelting value. The stone work and heavy timbers are being put in for a smelting plant. The machinery for the plant has been purchased and some of it is at Wilcox station, ready to be hauled to the camp. A part of the equipment will consist of two copper furnaces. Wm. Jenks is superintendent and E. A. Clark mine foreman. Capt. J. D. Burgess, general manager, states that the ore carries gold as high as $40 per ton. The character of the work and the position of the smelter will make it possible to handle the ore very economically.

WASCOTT.

Tucson, Ariz., Feb. 19th, '98.

Senator Tabor says he will build a smelter at Wickenburg, near Phœnix.

In Cedar valley, forty miles south of Kingman the Cedar Valley M. Co. is operating a 15-stamp mill on ore from the Arnold mine.

The Holland mine at Washington Camp, Pima county, has started up after lying idle for some time.

The efforts of the King of Arizona mine, in Yuma county, to obtain a water supply at the mine have proved futile. They contemplate putting in a tramway from the mine to the present mill-site at Mohawk, a distance of thirty miles. A 10-stamp mill will be put in and a cyanide plant added to work the tailings.

There are twenty-five men at work on the Copper Prince group, out from Tucson. The mines are producing ore of good grade.

The tailings at Smith's mills, says the Phœnix *Republican*, which M. McLeisch has been cyaniding for three years, produced from $5 to $8 a ton.

From thirty-five to forty tons of tailings per day are treated at the Little Jessie mine, near Prescott, by the cyanide process, with a result of from $8 to $10 per ton gold. Some of the tailings yield as high as $18 per ton gold.

Work on the Loudon-Gallen mine in the Whetstones, in Cochise county, is being pushed.

In the Mammoth mine, near Tucson, it is said that an ore body of good value has been struck on the 600-foot level.

MEXICO.

The Grand Central M. Co. will run a pipe line from Las Amarillas to San Jose de Pimas.

A Press telegram states that O. Jensen of St. Louis arrived in Casas Grande, State of Chihuahua, with $800 in gold dust, which he cleaned up in three months from a placer located in the Sierra Madre mountains. Jensen refuses to divulge the location of the placer grounds. He says he will clean up $10,000 this year.

The Corralitos Co. is erecting on the line of the R. G. S. M. & P. road, two miles from Juarez, a concentrating plant of a daily capacity of 200 tons. In connection with the concentrator, they are putting up sampling works able to sample 500 tons of ore per day. The company will also engage in a general ore purchasing and sampling business. In addition to the concentrating and sampling plant, they will at once build two 100-ton smelting furnaces—one for silver and lead and the other for copper. The company is pushing development work on all of the Corralitos mining properties and expects to begin shipping ores to the concentrator next month. To begin with, the concentrating and sampling plant will employ a force of fifteen Americans and about fifty Mexicans. Briton W. Davis is Gen. Mgr.

In the Creston mine at Minas Prietas a new vein of good ore was cut on the eighth level. Drifts are being run on the vein which show it to be continuous.

The combination shaft on the Grand Central mine at La Colorado is down 700 feet and ore is being hoisted. On the seventh level a body of good ore has been uncovered extending the width of the shaft, 21 feet.

THE recent ruling of the Commissioner of the General Land Office, which requires that $500 worth of work be done for each location before a patent can be issued, applies only to lode locations. In 1881 the Supreme Court of the United States decided a case taken up from Colorado that settled the question so far as it relates to placer locations. The case was entitled St. Louis Co. vs. Kemp. The Supreme Court held that "a miner's claim might consist of several locations, that several contiguous locations being purchased by one man became his claim." The court held that several locations, which touch, constitute one claim, and may be patented under one affidavit and upon one set of $500 improvements.

UNION IRON WORKS,

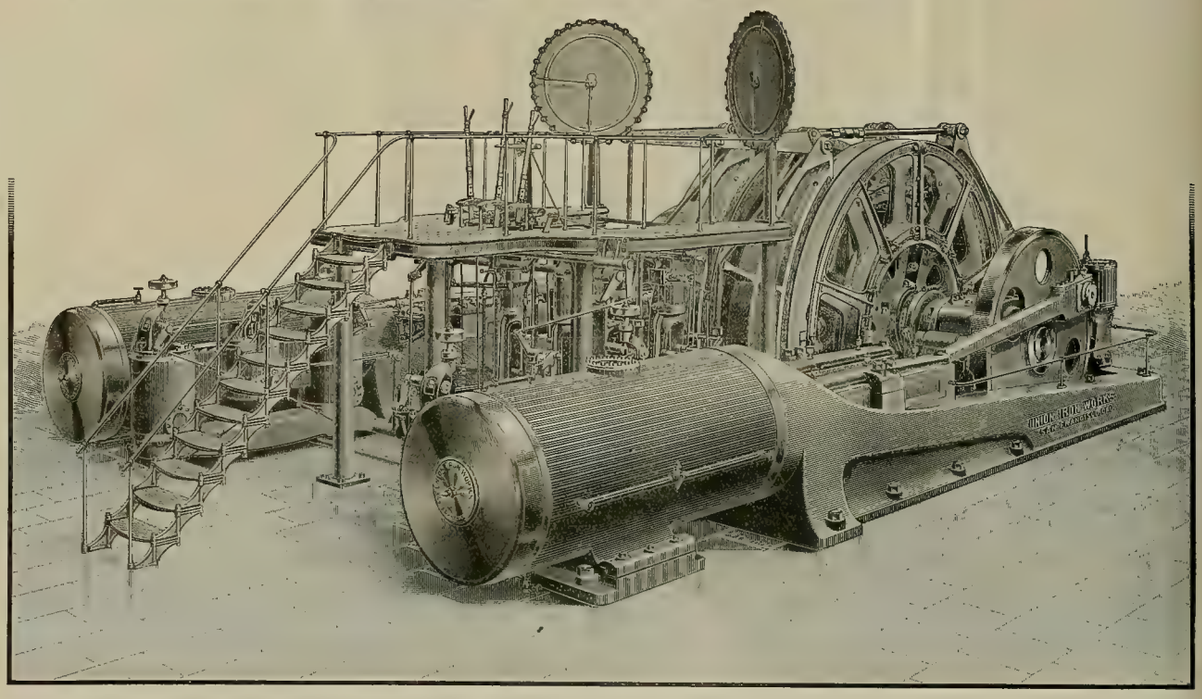
222 Market Street, San Francisco, Cal.

30 in. x 72 in. Direct Acting Hoisting Engine

BUILT FOR THE

Anaconda Copper Mining Company

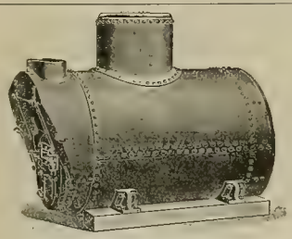
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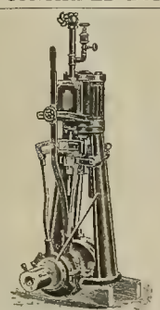
Embodying all that experience and practical working have demonstrated as valuable in this class of machinery.

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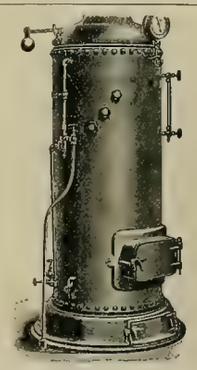
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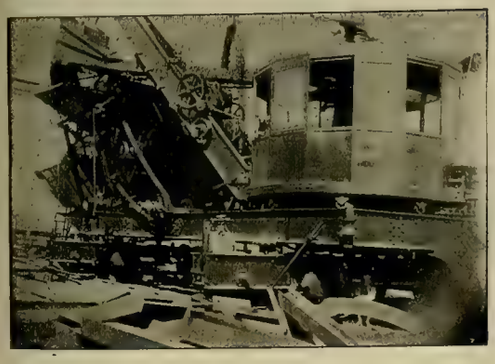
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1...	2500	2 to 4	25 to 150	150 tons	Single operating plant
2...	5000	2 to 3	50 to 300	200 tons	Duplex operating plant
3...	7500	2 to 2½	75 to 450	300 tons	Triplex operating plant

SWAMP AND RIVER-BED PLANTS.

Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
4...	2500	2 to 4	Barge	250 tons	Single amalgamator
5...	5000	2 to 3	Barge	325 tons	Duplex amalgamator

In general terms it may be said these plants consist of the electrically operated dredge and amalgamator, mounted either on steel barges for swamp or river-bed mining, or steel-bodied cars for "gulch," "bar" and "hill diggings," together with the necessary power plants for their operation. Several operating plants, either in close proximity or scattered over a large district, may be operated from a single power station, which may be situated at any convenient point within a radius of a few miles, at railroad depot or where water power can be utilized. The river plants, complete in themselves (each barge containing its own power), are made single or duplex: any suitable number of either can be operated on a river, each independently working its allotted section from surface to bedrock, and rim-rock to rim-rock. All these plants are built with a view to easy transportation, in "knock-down" shape over ordinary mountain roads, and, on special order, the size and weight of separate parts may be still further reduced. In the foregoing table the figure representing the smaller quantity of water required applies to cases where, for any reason, it is desirable or necessary to use the water over and over. The water required may be taken from below the placer, thus obviating the necessity of long ditches, etc. Since these plants neatly pile their debris on the cleaned-up bedrock of the ground worked, they may be said to create their own dump, and hence are enabled to successfully operate on flat ground, or where ordinary dumping facilities are lacking. This peculiarity also renders them independent of "debris laws." The wonderful perfection with which these plants extract the finest, microscopic particles, such as are held in suspension in water, or, when dry, ascend in a gentle current of air, constituting in bulk a perfectly impalpable powder (send for samples), renders them particularly valuable and indispensable in cases where, owing to the fineness of the golden particles, very rich mines are unavailable for profitable working by the hydraulic or sluice processes.

All plants are furnished with duplicate parts and wearing pieces to cover at least two years' constant use, while the life of the plant is conservatively placed at twenty-five years' active service. For further information address as above.

In San Juan County, Colorado.

Very different from the low altitude and warm valley where is located the Saginaw property in Arizona, depicted on the front page, is the San Juan country in southwest Colorado, of which Silverton is the commercial center. Its high altitude and snow-crested mountains do not prevent 800 miners working nearly every day in the year. The mineral output of the county for '97 was $2,500,000. Of the Silver Lake group, the Colorado State mine inspector says: "They are the most thoroughly equipped mines in the State." As in other parts of Colorado, so in San Juan county. When the miners found silver discredited, they turned their attention to gold, and gold is one of San Juan's present productions, though San Juan was and can be, if needful, among the first of the greatest silver-producing sections of the State. During '97 the Silverton smelter treated 13,380 tons ore, yielding 2431 ozs. gold, 186,173 ozs. silver and 920,800 lbs copper.

The handsome engraving of Silverton is from the office of the *Standard*, Silverton's leading mining journal, and is a good example of Colorado newspaper enterprise.

A YEARLY saving of about $709 will be realized by the Baltimore and Ohio Southwestern Railway by the use of electric motors for operating turntables. Experiments were made with one on the 60-foot turntable at Chillicothe, the current being purchased from the power plant, and costing on an average less than one-half a cent for each time the table was turned. When the same table was operated by hand it cost twelve cents for each engine. Besides, it generally takes four men to turn a locomotive, and while they are doing this their regular work is abandoned. The economy demonstrated by the experiment was no small item in the aggregate results.

Gases Met With in Mines.*

By WM. RALSTON.

Carbonic acid, or carbonic anhydrate, or CO^2, is composed of one atom of carbon and two atoms of oxygen.

Its specific gravity, 1.52, is heavier than air, therefore it is found on the floor of mines before it is mixed with the air. It is called "choke damp," "black damp," or "stythe" by the miner. It is colorless, invisible, and has a sharp odor and taste. It is composed of 72.7 per cent of oxygen and 27.3 per cent of carbon by weight. A candle will go out in air containing 10 per cent of it, air containing 3 or 4 per cent is unfit for respiration, air containing 6 per cent is dangerous to breathe, and 8 or 10 per cent is fatal to life. Some coal seams are subject to blowers of black damp (CO^2) very much in the same way as others are subject to blowers of fire damp. Blowers are usually detected as a cool air on the back of the hand. This black damp (CO^2) is also found in wells and should be tested before going down. If present in dangerous quantity, a lamp flame is put out by it. It may be removed in various ways. By quicklime in the process of slackening which absorbs the gas, by letting water fall down, and by drawing up the bucket several times.

Carbonic oxide (CO), one atom of carbon and one atom of oxygen; its specific gravity is .975; it is a little lighter than air. Out of 100 parts by weight there are 56.7 of oxygen and 43.3 of carbon.

It is called "white damp" by the miner, is colorless, tasteless, and poisonous, yet it has a slight peculiar odor. It does not in the ordinary sense support combustion, yet a candle or lamp will burn in it with mixture of air which at once destroys life. It is more poisonous than black damp (CO^2). Air containing 1 per cent of it is at once fatal to warm-blooded animals. Its most striking property is that it is itself combustible and burns with a beautiful blue flame. White damp (CO) is poison and enters the blood through the lungs, and its presence can be detected only after the death of the subject. The report of the French fire-damp commission gave its temperature of ignition at 1202° F.

Sulphureted hydrogen, or hydrogen sulphide (H^2S), two atoms of hydrogen and one atom of sulphur; specific gravity 1.17; is a little heavier than air. It is a poisonous and colorless gas. It does not support combustion or respiration, but is itself combustible and burns with a blue flame. Water dissolves from 2½ to 3 times its volume of the gas, and acquires its offensive taste and odor. Consequently it may be carried in the mine in a state of solution by the water and afterward liberated. Hydrogen sulphide (H^2S) is a gas injurious in the mines in various ways. It affects the iron rails, pumps, etc., and is found in mines as a decomposition of pyrites or of some animal substance containing sulphur. It is also a result of exploding gunpowder. The exact proportion of this gas that is fatal to life is not known; some authorities give it at ½ to 4 per cent. A light continues to burn in it, and its presence can be detected only by its odor.

Proto-carbureted hydrogen, fire damp (chemical symbol, CH^4) is an inflammable gas met with in mines. Its specific gravity is .56, and it is considerably lighter than air, and owing to this fact it has a tendency to rest against the roof of the mines and in cavities, unless disturbed by an air current. It is a colorless, odorless gas, scarcely soluble in water, and does not support combustion or respiration. It is not a poisonous gas, but if breathed in a pure state it causes death because it does not support respiration. It issues as a product of decomposition from the seams of the coal and when mingled with air in certain proportions it forms a mixture which has caused many destructive explosions. When fire damp (CH^4) forms one part to thirty of air and gas mixture its presence can be detected by the cap from a safety lamp. The maximum explosive mixture of fire damp and air is 9.6 air to 1 of fire damp. The French fire-damp commission gives its temperature of ignition at 1436° F.

*Paper read at the meeting of Ohio Institute of Mining Engineers, Jan. 21, 1898.



SILVERTON, SAN

The exact composition of after damp will depend on the composition of the explosive mixture, the most common being $1CO^2+7N+2H^2O$.

The origin of gas in coal is a matter of uncertainty. The coal being formed by vegetable matter, it is quite possible that during the process of decomposition new strata accumulated to such an extent as to cause considerable pressure, and when this newly deposited matter was of a porous nature the gas given off would escape through the strata to the surface. But when the cover over the vegetable matter was impenetrable the gas was retained at the increasing pressure as decomposition proceeded and the coal seams fully matured.

SOME comparative tests have recently been made at Chester, Pa., with a view to determining the relative efficiencies of direct connection and belt driving. A tandem-compound condensing engine was direct-connected to a 400-kilowatt generator running at 100 revolutions per minute, and in another test two condensing engines, at eighty revolutions, were each belted to a 225-kilowatt generator. The result of the test showed a saving in coal of 22.7 per cent in favor of the direct-connected engine. The difference in the interest on the cost of installation, however, would be comparatively small, and would reduce this figure only about 7.5 per cent. The brush holders are so arranged that by one hand wheel they must be simultaneously shifted, or by another all raised at one time from the face of the commutator.

As Seen by a Colorado Man.

Ex-Mayor Platt Rogers returned on Wednesday evening from a three weeks' trip to California, enthusiastic over the possibilities of gold production in that State.

"I see by one of the papers," said he, "that a man from Grass Valley, Cal., is here to look over some mines at Jimtown. That struck me rather peculiarly, as I had just left this country to go to Grass Valley to look at mines. That is to say, not exactly at Grass Valley, but at the mining districts in Tuolumne county, but the simile holds. It is the custom for man to look to a distance for relief, but in this instance I believe that my instincts are right. I think that California is going to astound the world with her development of gold. I believe more gold will be produced in that State than was ever dreamed of. At the same time, California is looking to Colorado for development. They say, 'If we had a few of your enterprising, energetic workers out here, we would make a marvelous showing.'

"The trouble with California is that she is sluggish. The great multi-millionaires, the men who made California what it is, like Fair and Mills and the rest of them, have moved away, while the other 49ers have simply settled down to enjoy the rest of their lives in comfort.

"California is not in the best of shape at present, owing, for one thing, to the hold that the Southern Pacific has on the State, and I would not advise you to start in business of any kind out there except in mining. In the southern part of the State it is different, for there it is Eastern capital that is at work, and Los Angeles is the best town on the coast at present—better even than San Francisco, although it should not be, for San Francisco is magnificently located.

"It is in the gold of that country, however, that I pin my faith. The mother lode, or gold belt, or whatever you want to call it, is known to exist from one end of the State to the other, and it is a known fact that gold can be reached at any point along it by sinking far enough. While there is a similar theory in Colorado, it is theory and nothing more, while in California it is an undisputed fact. This mother lode is practically covered with locations from one end to the other. They might be said to extend the length of the State in an unbroken line.

"There is not a new camp in the State. Every one of these new discoveries have been made in the old camps, nearly all of them being in abandoned claims—claims that were worked between 1849 and 1859. I secured a number of papers printed during the jubilee there and they gave accounts of conditions at that time, when flour was $50 a sack and other things in proportion. It did not pay to work the mines, for they could not get enough out of them to pay for the necessities of life at those prices, but at present prices they are worked with great profit.

"It was the same way in Colorado. I know that it doesn't sound well to say it here, but the demonetization of silver was the greatest godsend that Colorado ever had. Gilpin county was asleep for years, while Leadville was booming. It was just what Leadville is to-day, but the demonetization of silver brought about the development of gold properties and to-day Colorado leads in the production of gold with over $23,000,000, whereas before the repeal of the silver bill it was far below $10,000,000.

"One of the great features of the California gold belt is that the mineral is all free gold. I know properties in Boulder county—good properties—that have been abandoned on account of refractory ores. As long as the ore was easily reduced these mines were worked, but when the live ore was struck they were abandoned, owing to the difficulty in reducing them.

"In California it is all different. The gold is free gold, the next thing to placer gold. There all the miner has to do is to erect his own stamps, run his ore through them and take the bullion out of the plates. He has no milling fees to pay, no smelting fees, no combination of smelters to fight, no costly reduction or concentration processes to go through, no exorbitant freight charges, and is in every way owner and master of his own property.

"Colorado men who are in the field there—and there are plenty of them—say that California is the great gold State, and they are preparing to take up properties. One of them prepared a map for me from the government surveys, showing the unbroken line of claims from one end of the 700-mile State to the other."—Denver Post.

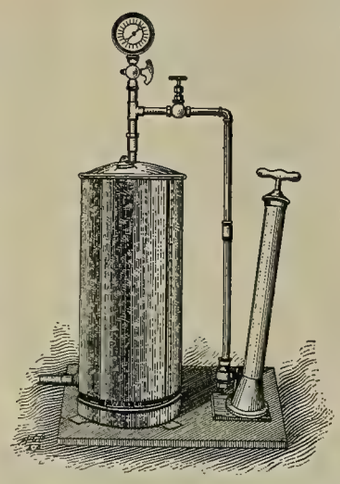


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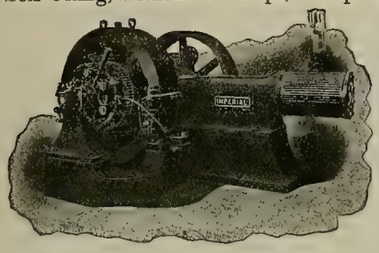
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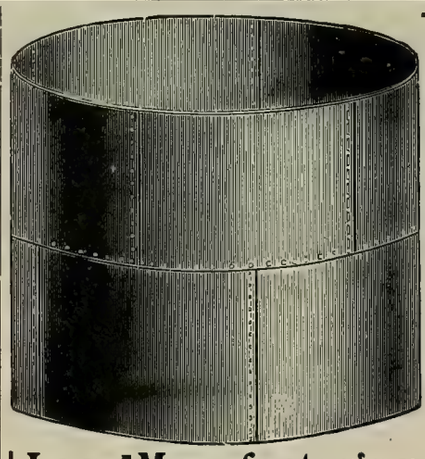
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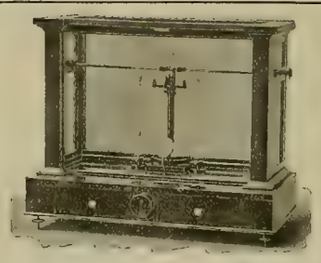
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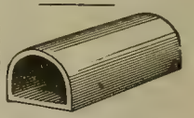
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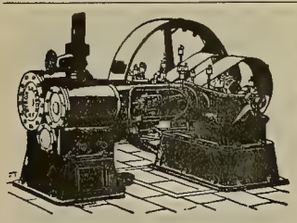
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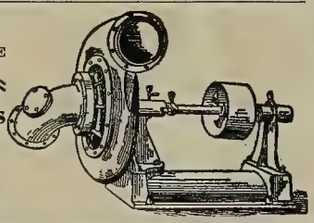
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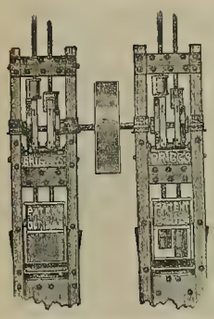


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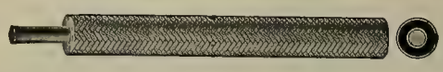
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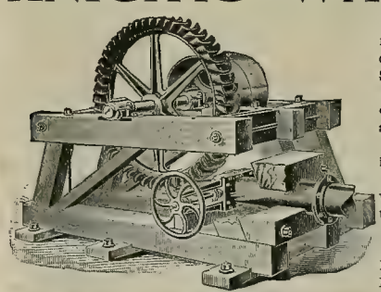
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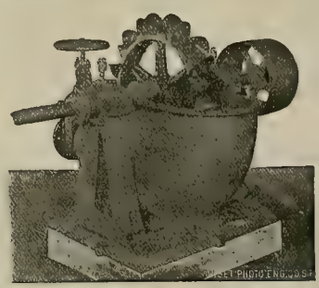
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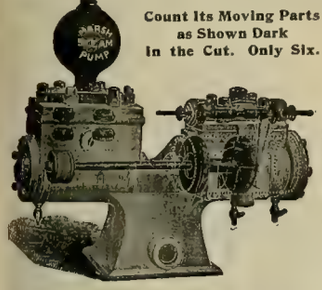
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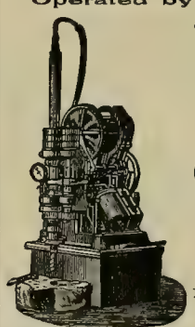
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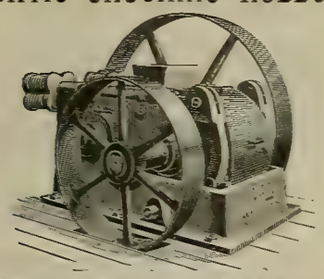
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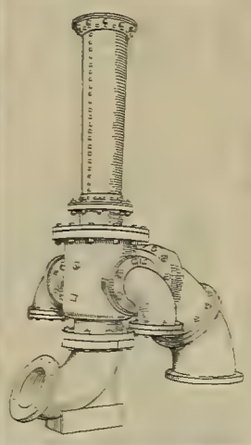
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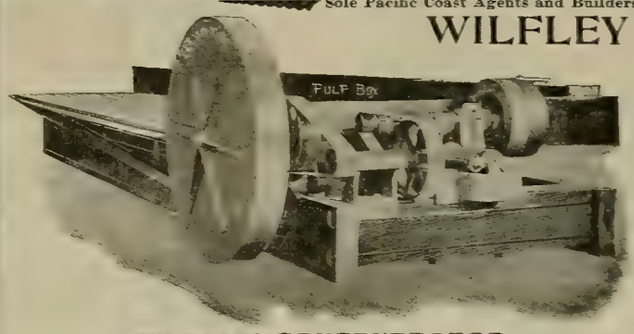
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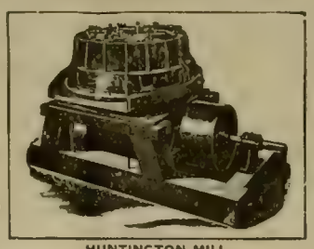
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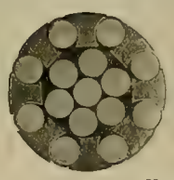
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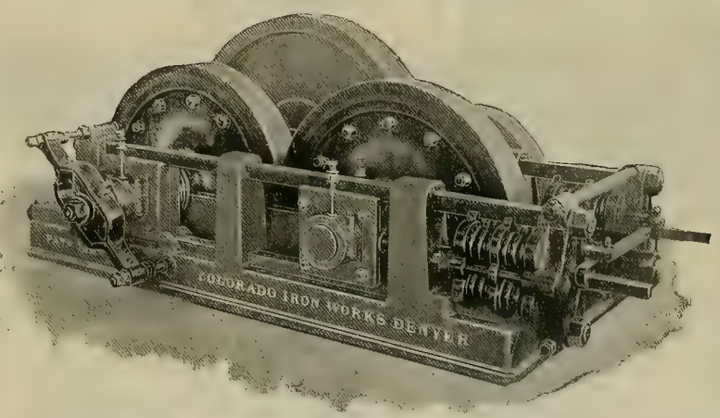
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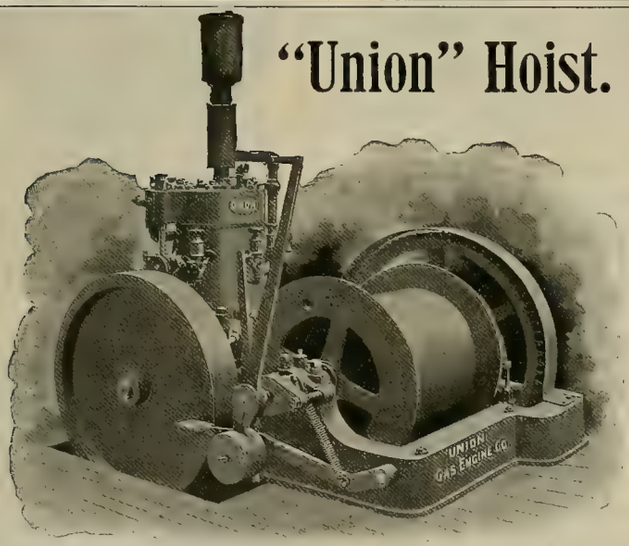
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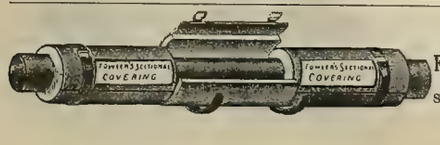
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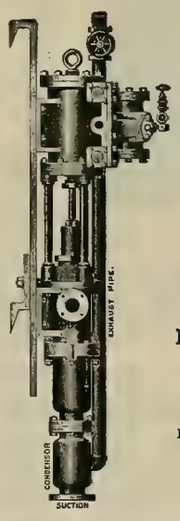
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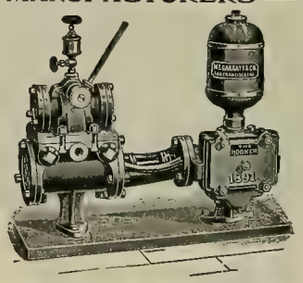
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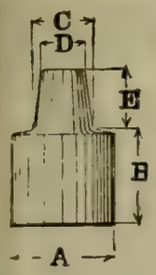
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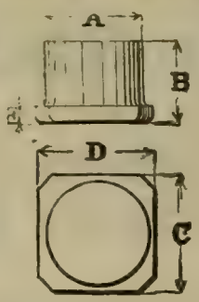
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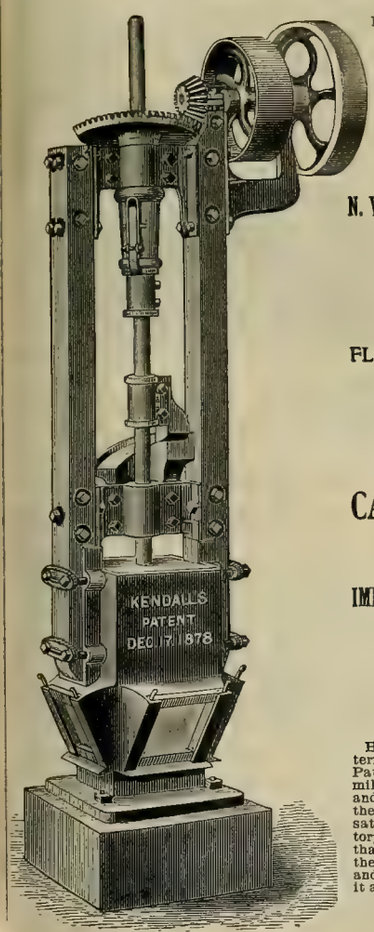
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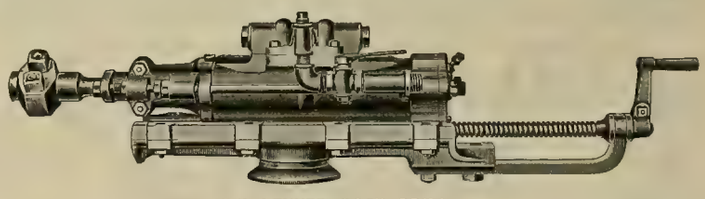
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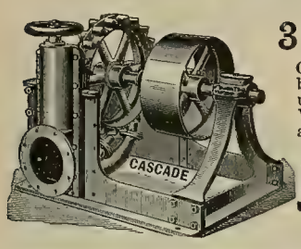
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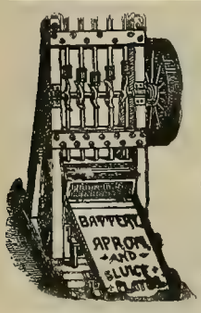




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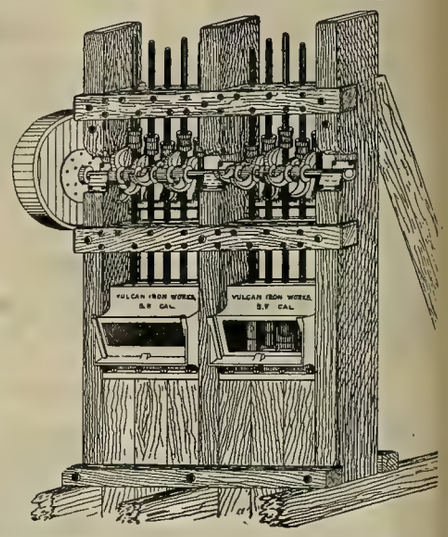
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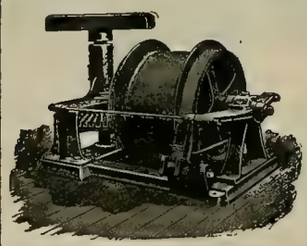
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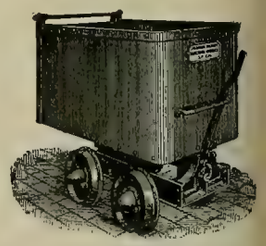
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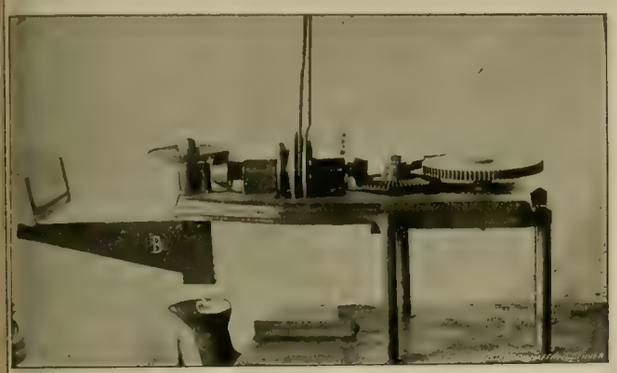
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The "SPADONE" Curved Edge Concentrator Belt is attracting much attention among mining men, its merits appealing to the millman o practical experience.

Illustration (Fig. 1.) shows a cross-section, and (Fig. 2.) shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

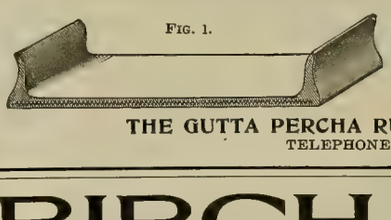


FIG. 1.

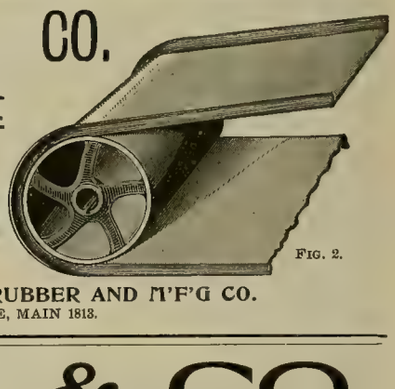
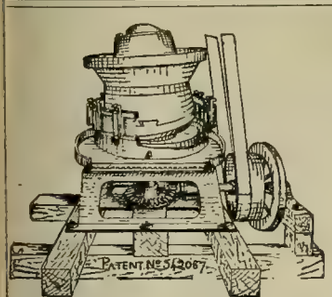


FIG. 2.

We shall be pleased to quote you also on Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING and RUBBER PACKING. Correspondence Solicited.

THE GUTTA PERCHA RUBBER AND M'F'G CO.
TELEPHONE, MAIN 1813.



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W. H. BIRCH & CO.,

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No. 2 MILL—3 TONS CAPACITY, 1 1-2 H. P., = = $225.
No. 3 MILL—10 TO 15 TONS PER DAY, 3 1-2 H. P., $600.

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"BIRCH" TWO-STAMP MILLS, McGLEW CONCENTRATORS, AND ALL KINDS OF MINING MACHINERY.

CYANIDE Highest Known Grade OF CYANOGEN. POTASSIUM.

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In 112-lb. Zinc Lined Cases.

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SCHOELLKOPF, HARTFORD & MACLAGAN, Ltd., Sole American Agents.

100 William Street, NEWYORK CITY.

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with State Law.

FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco

Market Reports.

The Markets.

SAN FRANCISCO, Feb. 24, 1898.

The demand by outfitters for Alaska and the Northwest Territory fills the gap between seasons in our markets, for January and February have always been dull months. It is not outfitters alone that are calling for supplies, for good-sized orders are being filled for dealers at the leading distributing points in Alaska and British Columbia. It is worthy of mention that Seattle and Tacoma, on Puget sound, and Portland and Astoria in Oregon are buying quite heavy. The volume of goods going to them is said to be double that of a year ago. Rains which began to fall last night are said to be general in this State. They are not only heavy, but soaking, and if they continue for the next twenty-four or thirty-six hours are worth hundreds of thousands of dollars to the State at large. Their effect is seen already in our city, for business men in general look more cheerful, and well they may, for it means dollars to them and also a large increase in business.

The local money market is practically unchanged. All the money wanted can be had on unquestioned security, but where there is any doubt it is hard to get accommodations from bank. The funds in bank are said to be increasing with a light call for any purpose. The disbursements by outfitters for Alaska and the Northwest Territory aggregate several hundred thousand dollars a week, with a steady increase expected for the next four or five weeks. The receipts of bullion from mines in this and adjoining States are increasing, now that cold weather has given place to higher temperature. It is stated that the outlook is promising for more capital going into mines this year than in 1897. Several sales have been made, while negotiations are pending for others. The largest consideration, so far, is $400,000 for a deep mine on the mother lode.

New York Silver Prices.

NEW YORK, Feb. 24.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	25 13-16	55¾
Saturday	25 13-16	55¾
Monday	25¾	55¾
Tuesday		
Wednesday	25⅝	55⅛
Thursday	25⅝	55⅛

	Copper.	Lead.	Iron.	Tin.
Fri.	11 30 @11 50	3 50	10 00@12 00	14 10
Sat.	11 30 @11 50	3 77½	.....@.....	14 10
Mon.	11 30 @11 50	3 80	10 00@12 00	14 05
Tue.	..... @.....	.....	.....@.....	.....
Wed.	11 30 @11 50	3 80	10 00@12 00	14 05
Thur.	11 30 @11 50	3 80	10 00@12 00	14 05

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.82¾
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	55½
Mexican Dollars nominal	46@—

SILVER.—The market has sold to lower prices, with the closing at New York and abroad easy. It is hard to locate any particular cause for the decline, as it seems to be based on several. The political unrest abroad and the strained relations between the United States and Spain undoubtedly have something to do with it, as also the placing of Council bills for India. The placing of an $80,000,000 loan by China may possibly call for some silver, and if so it will have a favorable influence when it sets in.

MEXICAN DOLLARS.—The market is quiet, with a light inquiry for China.

COPPER—The market has moved to still higher figures under a continuance of the heavy export movement and increasing home consumption. The stocks in this country decreased in January nearly 5000 tons, notwithstanding free deliveries by mines. The general tenor of advices is to the effect that the spring months will see a still further increase in the consumptive demand at home and abroad, which will cause a further strengthening in prices at the East.

Our market is quoted as follows:

Ingot casting, jobbing	13 @—
Ingot " wholesale	12½@—
Sheet copper	16½@—
Bolt ¼ and 5-16, 20c; ⅜ and larger,	16½

TIN.—The market has held to fairly steady prices for ingot under fair offerings at the East for shipments from primary markets. The decline in silver is favorable for buyers of Straits. Tinplate is easy, with some cutting. There is a good movement, as the canning season on this coast is opening.

The market is quoted in jobbing lots as follows:

Pig	4 75 @ 5 00
Sheet	@ 6 50
Pipe	5 30 @ 5 80

LEAD.—There is a steady tone to our market, but at the East it looks as if they are not so strong. If advices are not misleading, there ought to be quite an increase in the consumptive demand in this country, and, if so, stiffer prices are not at all unlikely to rule.

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, "	4 00@—

SHOT.—Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do. " "	1 60

QUICKSILVER.—New York mail advices report a strong market, but ours is unchanged.

Our market is quoted at $39 for domestic consumption and $35@36 for export to the west coast of Mexico.

IRON.—Our market is practically unchanged. Imports the past week aggregate 957 tons from Baltimore. The East reports continued ease in the markets notwithstanding the heavy consumption at home and large export movements.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—Lower temperature increasing receipts by mail from east of the mountains and also from the sound and foreign ports have caused a decline in Seattle and Coos Bay. The decision of the courts against the coal combine has something to do with the weakening, for dealers can now buy of any one and any kind of coal.

Receipts of coal for the week ending with Tuesday were as follows in tons: Departure Bay 5756; Puget sound 6700; Coquille river 285; Sydney 2439; Nanaimo 6459; Cardiff 2488; Baltimore 3580; Newcastle, N. S. W., 2295. Total 29,513.

SPOT FROM YARD—PER TON.

Wellington	$10 00@— —
Greta	6 50@— —
Nanaimo	8 00@— —
Gaman	6 00@— —
Seattle	6 00@— —
Coos Bay	5 00@— —
Cannel	10 00@— —
Egg, hard	13 00@— —
Wallsend	9 00@— —

TO ARRIVE—CARGO LOTS.

Australian	6 25
Liverpool Steam	7 00
Scotch Splint	— —
Cardiff	— —
Lehigh Lump	12 00
Cumberland, bulk	9 00
Egg, hard	10 50
West Hartley	7 25

COKE.—The market is steady, with a good demand ruling. Imports the past week aggregated 1710 tons from Newcastle, England, and 185,000 kilos from Antwerp.

Gas Companies'	— —
English, to load	— — @ — —
" spot, in bulk	11 00 @ — —
" in sacks	12 00 @ — —
Cumberland	10 00 @ — —

BORAX.—The market is firm, with a strong demand from the East. The market is quoted as follows:

Refined, in carload lots, in barrels	7
Refined, in carload lots in sacks	6¾
Powdered, in car lots	7
Concentrated, "	6½

POWDER.—The market is steady at current quotations. The market is quoted as follows for Hercules: No. 1, from 11¾c to 17½c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

PLATINUM.—The market is unchanged. Our market is quoted in a jobbing way at $16 per ounce and for scrap $11 per ounce.

ZINC.—The market is steady. Our market is quoted at 10@15c, according to thickness.

ALUMINUM.—The market is firm. We quote in jobbing lots at 45@50c per pound for ingots.

Chemicals.

The demand is quiet but it is expected to improve soon, when it is expected that some changes will be made in quotations, as the stocks in jobbers' hands are small. New York mail advices report quiet markets at unchanged quotations.

CYANIDE OF POTASSIUM.—The market is steady. Our market is quoted for chem cal pure, 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The market is firm. We quote in a jobbing way at 1½c per lb. for 66%.

ACETIC ACID.—The market is firm at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BONEASH.—There is a good demand for export. Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady. We quote in a jobbing way at 4c per pound.

SPELTER—The market is steady. We quote our market in a jobbing way at 5c per pound.

BISMUTH.—The market is firm. Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (Le Blanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—The market is about the same as it has been for a month past. Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady. We quote in a jobbing way at 70 to 75 cents per pound.

Mining Share Market.

SAN FRANCICO, Feb. 24, 1898.

The market has dragged throughout the week, with quite an easing off towards the close. The actions of the market, more than all else, emphasize the belief with the shrewder and more successful operators that the moneyed pool is back of the manipulation, which is being done by one person in its interest. By hanging assessments over the market, reporting failures in the work going on in the mines, and not bidding for shares, but quietly taking all thrown out by disgusted holders, the pool can concentrate the more desirable, which it is doing. When reports were current of an ore strike in February the MINING AND SCIENTIFIC PRESS asserted there would not be any, or at least not made public, and it now looks as if March and perhaps part of April will pass before ore is reported and the market made active at advancing prices. This opinion is based on the work in mines which is of a kill-time character, so as not to make a development until after the next line of assessments has been collected. But the officials of the company are powerless to prevent it. The departure of J. L. Flood for Japan on a two months' trip is taken advantage of by bears to sell shares, which are being taken in by the pool of which Mr. Flood is said to be a member, but does not control. The heavy disbursements in this city by persons going to Alaska and the Northwest Territory are causing idle money to accumulate. These purchases also make a more hopeful and speculative feeling, which is further strengthened by reports of good, soaking rains throughout the State. These rains allay all fears regarding crops. That they will be followed by spring rains is not doubted in the least. With good crops, mining booming, all industries forging ahead, business active and money plentiful, the desire to speculate will grow. This, no doubt, is the leading reason why the pool is freezing outsiders out of their holdings and concentrating shares for a big move later on. The growing desire to speculate is not confined to this coast, for it extends to the East, where, if a good opportunity is given, operators on the different exchanges would take hold with spirit and put large sums of money into the game.

The news from the Comstock mines is practically unchanged, so far as official letters report work in the different mines. With a postponement of any move in the share market so as to better concentrate it, it is not to be expected that any favorable news will be allowed from official sources, even if there is any to report. The slow progress that is being made, and also changing of some of the work, so as to take more time, is not being done in all the mines, but it is in some, say reports from Virginia City. In Utah they are running a northwest drift. Work in the north drift has been stopped. The official letter from Sierra Nevada reports they are raising for connection between the Riley tunnel and surface for ventilation. This work we reported two weeks ago. They have stopped work in west crossdrift No. 5 on the 900-foot level and resumed work on the north lateral drift. In Union work the past week has been confined largely to repairing and retimbering. From Mexican there is nothing new reported, the work still being to the east on the 1000-foot level. The work in Ophir is reported to the west on both the Central tunnel and 1000-foot levels. No change is reported in the material encountered. The work in Con. Virginia is on and about levels 1550, 1650 and 1750. So far as we can learn, the contemplated new work on the 1650-foot has not been started. The work in this mine shows considerable activity, with some ore raised last week, as it is pushed forward. The joint work of Best & Belcher and Gould & Curry is to the east on the 800-foot level. In Choliar they are running west from the upraise from the 100-foot level. They are still putting in two sets of timber in the 1100-foot incline. Joint work by Potosi and Bullion is drifting from the Potosi tunnel level and repairing the old Crœsus shaft.

In Alpha they are engaged in blocking out ground on and about the 500-foot level and incidentally to kill time by procrastinating in more important work. The work by Challenge and Confidence is jointly with Con. Imperial in running the long west crossdrift. The flow of water has about subsided. The material encountered shows an improvement. In Yellow Jacket they expect to start some time in next month work on the 1000-foot level. From Crown Point, Belcher and Sego Belcher nothing new comes to hand. It looks as if in the first two favorable news ought to be had within the next sixty days, unless its work is stopped or turned aside. In Overman they are raising a few tons of ore while doing exploiting work. In Caledonia it is stated that preparations have been completed for renewing active exploiting work on the level we reported last week. It is stated that ore is known to exist on that, but whether it is the intention of striking it is one of the Comstock problems which time alone can solve. In Justice they are raising ore which is being milled. Work in Alta is progressing fairly well. They are raising a few tons of ore each week which assays over $55 to the ton.

From the Brunswick lode there is nothing new to report since our last week's review. The Occidental management are quite hopeful they are developing a valuable mine. So far the work shows quite an extent of ore which will pay to extract and mill. Work on the 550-foot, 650-foot and 750-foot levels, and also in the winze sunk below the latter level, shows that the ore is from 8 to 20 feet wide, with an average assay value of $20 to the ton. This will pay to mill. In Potosi work is confined to the 500-foot and 600-foot levels, with usual prospecting and repair work reported. The joint shaft is down over 1020 feet on an incline. They have stoped west crossdrift on the 200-foot Choliar level. On the 300-foot level they are stoping, with no change to report. In Savage the work is the same as heretofore reported. The joint work of Gould & Curry, Best & Belcher and Con Virginia is going west, and also south on the 600-foot level. They are also sinking the shaft, which is down over 1000 feet.

The following illustrates the changes of the week:

MINES.	Feb. 17.	Feb. 24.
Alpha	.....	.....
Alta Consolidated	.....	$ 16
Andes	$ 14	11
Belcher	29	23
Best & Belcher	45	39
Bodie	.....	.....
Bullion	.....	.....
Challenge	.....	.....
Chollar	.....	.....
Confidence	.....	.....
Consolidated California and Virginia	98	86
Consolidated New York	.....	.....
Crown Point	18	12
Exchequer	.....	.....
Gould & Curry	.....	20
Hale & Norcross	1 65	1 50
Justice	.....	15
Mexican	.....	33
Ophir	55	47
Overman	08	06
Potosi	.....	18
Savage	27	26
Sierra Nevada	74	98
Union	38	35
Utah	11	.....
Yellow Jacket	28	22

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 24, 1898.

9:30 A. M. SESSION.

100 Belcher	23	300 H. & N	1 50
100 Best & Belcher	37	100 Justice	15
300 Con Cal & Va	85	100 Savage	26
50 Gould & Curry	20		

SECOND SESSION—2:30 P. M.

100 Ophir	47	400 Belcher	23
200 Mexican	33	200 Sierra Nevada	98
200 Best & Belcher	39	300 Overman	06
300 Con Cal & Va	86	650 Union	35
200 Potosi	18	700 Alta	16
300 Crown Point	12	100 Andes	11
200 Yellow Jacket	22		

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Alpha Con M & M Co, Nev	20	5c	Feb 1	Mar 8	Mar 29 C E Elliot, 309 Montgomery
Baltiol G M Co, Cal	2	30c	Jan 26	Mar 4	Mar 28 R L Cheney, Mills Building
Challar M Co, Nev	45	20c	Jan 8	Feb 11	Mar 8 C E Elliot, 309 Montgomery
Crown Point G & S M Co, Nev	73	10c	Feb 21	Mar 28	Apr 18 Jas Newlands, Mills Bldg
Fall River Con G Q Co, Cal	11	5c	Jan 15	Feb 25	Apr 21 A Lorsbach, 313-315 Front
Marguerite G M & M Co, Cal	9	10c	Feb 19	Apr 6	May 2 F Mettmann, 225 Sansome
Marina Marsicano G M Co, Cal	12	9c	Jan 3	Feb 7	Feb 28 Chas Bovone, 217 Sacramento
Mexican G & S M Co, Nev	58	15c	Jan 6	Feb 10	Mar 3 Chas E Elliot, 309 Montgomery
Ophir S M Co, Nev	72	25c	Feb 24	Mar 29	Apr 18 E B Holmes, 309 Montgomery
Orleans M Co, Cal	7	10c	Feb 1	Mar 8	Mar 28 Geo O Thurston, 575 Mission
Overman S M Co, Nev	79	5c	Jan 26	Mar 2	Mar 23 G D Edwards, 414 California
Potosi M Co, Nev	49	20c	Feb 5	Mar 11	April 4 C E Elliot, 309 Montgomery
Red Cap M Co, Cal	2	$5	Nov 29	Jan 6	Feb 26 H H Martin, 326 Beale
Savage M Co, Nev	84	25c	Jan 6	Feb 8	Feb 28 E B Holmes, 309 Montgomery
Sierra Nevada S M Co, Nev	114	20c	Jan 19	Feb 23	Mar 14 E L Parker, 309 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19	Feb 26	Mar 21 A F Frey, Phelan Building

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage.

Money loaned mines.

Mining companies organized, their property experted, financed and managed.

Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated

Examine mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

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THE HEDGE GOLD EXTRACTORS.

SAN FRANCISCO, CAL., Feb. 12, 1898.

J. W. Wolfskill, Los Angeles, Cal.

DEAR SIR:—While passing a few days at the Miners' Golden Jubilee Fair in this city I saw an exhibit of the Hedge Gold Extractors, which, in my judgment, are the best and most perfect machines for saving fine gold that I have ever examined. They are built in two styles, one a placer machine and one a quartz mill machine, and are manufactured in different sizes. The small machine is for placer work, with pump attached which works the water over and over. By this means it requires very little water to operate. The tables are set on ball bearings and run very lightly. Any size can be run by hand power. The light machine weighs about 250 lbs; built almost entirely of metal, which can be knocked down and packed in the water tanks and screen tables; can be set up in a short time, and could be packed on mule back. When packed it is in three packages: large package 24x30 inches, 6 inches deep. These machines are manufactured by the Pacific Mining Machinery Co., 127 First St., S. F. I have examined and made comparison with all other machines on exhibit in this fair, and am fully of the opinion that this Hedge machine excels all, and that for gold-saving devices for districts where but little water can be had, or transportation difficulties exist, nothing thus far has been patented to equal it. If you visit the city, it may be of value to you and other friends in your section to see and examine it. Very truly yours, A. B CONRAD.

TEN WEEKS FOR TEN CENTS!

Strange as it may seem, that big family paper, the *Illustrated Weekly Sentinel*, of Denver, Colorado, (founded 1890) will be sent ten weeks on trial for 10c.; clubs of six, 50c.; 12 for $1. Special offer solely to introduce the paper. Gold rings set with Rocky mountain gems are given free as premiums. Latest mining news and illustrations of grand scenery each week, also true stories of love and adventure. Address as above and mention PRESS. Write today; postage stamps taken.

Working Capital for Mines.

PACIFIC EXPLORATION COMPANY

Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 23-30 Chronicle Building, S. F.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from William N. Lamb, in the Croff Mine, near Oleta, Amador Co., to deposit tailings behind the dam of the Cambridge Mine, in Dry Creek; from B. F. Steese and O. Woehler, in the Long Ravine Mine, near Spenceville, Nevada Co., to deposit tailings in Long Ravine; and from J. W. Cummins, in the Amo Mine, near Oroville, Butte Co., to deposit tailings in Cherokee Ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on February 28, 1898, at 1:30 P. M.

A GOOD INVESTMENT

Three Dollars Brings This Paper One Year--Fifty-Two Issues. Can You Afford To Be Without It?

Rainfall and Temperature.

The following data for the week ending 5 A. M., February 23, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Maximum Temperature for the Week	Minimum Temperature for the Week
Eureka	2.24	24 11	35 97	30 15	32	64
Red Bluff	34	9 60	30 94	18 08	36	62
Sacramento	.30	7 04	14 47	13 97	38	62
San Francisco	44	6 50	17 76	16 63	43	62
Fresno	.12	3 35	8 58	6 60	32	74
San Luis Obispo	.08	3 96	17 36		38	72
Los Angeles	.00	4.11	14.43	11 81	42	72
San Diego	.00	3 38	10.11	7 44	42	62
Yuma	.00	1 26	4.87	2 58	40	82

Commercial Paragraphs.

THE Pelton Water Wheel Co of San Francisco have shipped a complete wheel and pipe system for operating the Republic G. M. & M. Co's. mill, on the Colville reservation.

J. R. CLARK, Mgr. Los Alamitos beet sugar factory, has given an order to the Lacy Manufacturing Co. of Los Angeles for the construction of a 30,000-barrel tank, to be erected at the sugar factory.

A SHIPMENT to the Alton Mining Company of Albuquerque, New Mexico, of a 10-stamp mill, 850-pound rapid drop, crusher, four feeders, two concentrators, boiler, engine, etc., was made last week by the J. H. Montgomery Machinery Company, Denver, Colo.

THE E. P. Allis Co. of Milwaukee has a contract to furnish a 700,000 H. P. plant for the Metropolitan Street Railway Co. of New York. The order amounts to about $500,000, and the equipment will comprise one of the largest electric power plants in existence.

F. KAHN, a mining engineer from the City of Mexico, has on exhibition at 319 Bush street, room 108, a gold-saving machine that has the appearance of being practical and well adapted to conditions prevailing in Alaska, and in localities where water is scarce. It is claimed that a large number of these machines are in use in Mexico.

THE Royal George M. & M. Co. are putting in a Beam furnace and a fifty-ton amalgamating plant, to be erected near Canyon City, Colorado. The Colorado Iron Works Co. are furnishing the machinery and are putting in their patent high speed, narrow face rolls to do the crushing. The Colorado Iron Works Co. shipped five carloads of smelting machinery last week to the Buena Vista S. & R. Co., at Buena Vista, Colo.

WANTED.—Position to take charge of a quartz mine. Am a practical miner, and have had charge of a number of properties in different States for the last 20 years. Can furnish the best of reference. Address J. D., Mining and Scientific Press.

Position as Manager or Superintendent of Mines and Mill.—A mining engineer of 20 years' practical experience in mining, milling and placer mining, understands construction and operation of stamps, Huntington's and roller mills, amalgamation and concentration to any degree of fineness with jigs, buddles, vanners, bumpers, and Wilfley tables; makes surveys, maps and plans of mines and mills, and does practical assaying; experienced in handling free gold, and sulphurets of iron, copper, lead, zinc and quicksilver; can examine and report on mines; will be open for engagement about March 1, 1898. Box 30, Mining and Scientific Press.

A Physician,

aged 27, unmarried, wants position as company surgeon with a mining or construction company, or two years assistant surgeon in Cook County Hospital, Chicago. First-class references.

Address **R. U. CRAIG,**

Box 172.....Phœnix, Arizona.

DIVIDEND NOTICE.

JAMISON MINING COMPANY, Rooms 50 and 54, 9 Sutter St., San Francisco Cal., January 25th, 1898. DIVIDEND NUMBER ONE.—At their meeting of January 25th, 1898, it was resolved by the Board of Directors of the Jamison Mining Company to pay to the Stockholders of the Company from the surplus funds in the treasury, a dividend of Nineteen Thousand Five Hundred Dollars ($19,500), being Five Cents (5 cts.) per share on the capital stock of the Company. The dividend will be payable at the office of the Company on the Fifteenth (15th) day of February, 1898, to all stockholders of record on the Fifth (5th) day of February, 1898. Transfer books will be closed at the close of business on the 5th of February, and reopened on the morning of February 16, 1898. SAM. W. CHEYNEY, Secretary.

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Assessment Notices.

THE ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley Mining District, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1898, an assessment (No. 7, new series) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 575 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. O. THURSTON, Secretary.

Office—No. 575 Mission street, San Francisco, California.

BALIOL GOLD MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1898, an assessment (No. 2) of 30 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of March, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Mills building, room 7, fifth floor, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of February, 1898, an assessment (No. 9) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 1 to 4 P. M. at his business office, 225 Sansome street.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Humboldt County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 29th day of November, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Harvey M. Binckley	2	1	5 00
Alice E. Binckley	20	4	20 00
Alice E. Binckley	23	20	100 00
Alice E. Binckley	24	20	100 00
Alice E. Binckley	25	20	100 00
Alice E. Binckley	26	20	100 00
Alice E. Binckley	39	1	5 00
Alice E. Binckley	40	2	10 00
Caroline S. Townsend	18	20	100 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the corporation, 125 Beale street, San Francisco, California, on SATURDAY, the 29th day of January, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the day of sale of the above delinquent stock has been postponed to SATURDAY, February 26th, 1898, at the same hour and place. H. H. MARTIN, Secretary.

Office—125 Beale street, San Francisco, California.

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 12) levied on the 3rd day of January, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
L. P. Drexler	87	10	90
Leo Alexander, Trustee	85	17,990	1,619 10

And in accordance with law, and an order from the Board of Directors, made on the 3rd day of January, 1898, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 28th day of February, 1898, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale. CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

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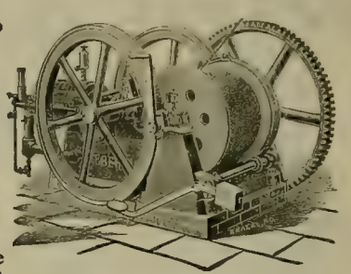


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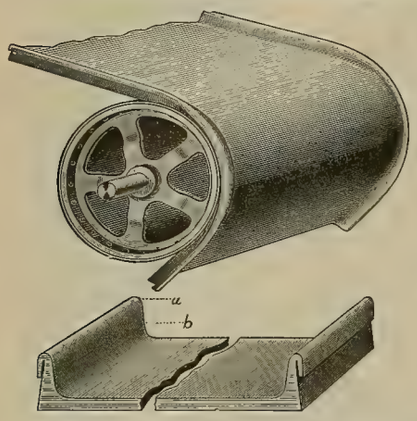
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SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
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MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.
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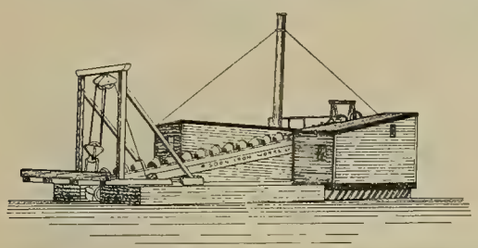
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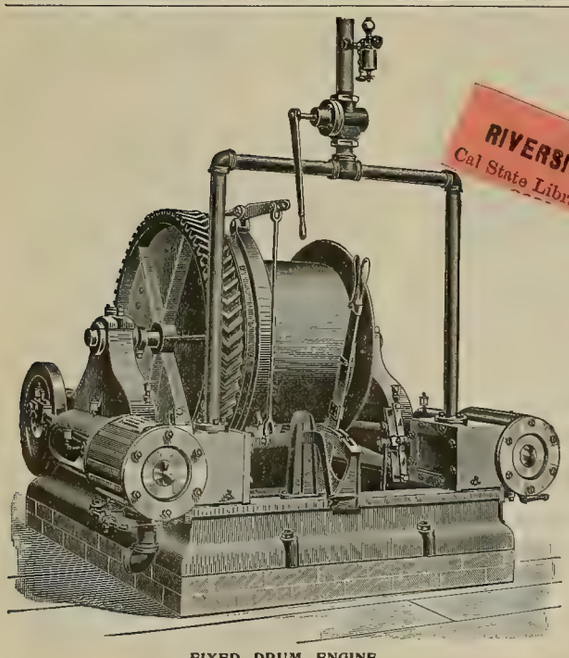
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AND PACIFIC ELECTRICAL REVIEW.

No. 1965.—VOLUME LXXVI. Number 10. SAN FRANCISCO, SATURDAY, MARCH 5, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Alaska Mining Companies.

The tales of treasure from farthest Alaska do not detract from the work of development going on in other parts of that immense area of gold-producing country. Great undertakings and great returns are in gold quartz properties, so singularly situated, in several instances, that the product from the mine goes by gravity to the vessel at the ocean wharf close by. At Berner's Bay, forty miles north of Juneau, on that arm of the sea known as Lynn canal, lie the properties of the Berner's Bay Milling & Mining Company, recently transferred to the Seward, Northern Belle and Ophir gold mining companies. In the Comet, among the holdings of the former company, the lower workings are the deepest in Alaska—1000 feet—depth there, as in other regions, demonstrating the permanency of the lode, for, as in California, Alaska claims the possession of a "mother lode." Herewith is presented a view of the 40-stamp mill of the B. B. M. & M. Co. A great amount of development work has been done, and the property possesses all the up-to-date adjuncts of a modern mining plant—electricity, compressed air, steam, wire-rope tramway, modern mill appliances, heavy, rapid-drop stamps, etc. Some of the ore from this mine is considered too rich to be blasted out in the ordinary way, but is mailed down with bar and sledge upon canvas spread on the floor of the drift to prevent scattering.

In Sheep Creek Basin the Nowell Gold Mining Company operate a 30-stamp mill, shown in the engraving. As in the case above cited, this property has many of the latest devices for economical working—a railway, aerial tramway, electric plant, etc. The mill tailings are worked by an extensive system of blanket sluices. These and other Alaska mines exhibit the unique sight of a quartz mine directly on the ocean coast, the Sheep Creek mill being but one-half mile in from the beach, where deep-sea-going vessels lie at the wharf. To the courtesy of the *Mining Record* of Juneau we are indebted for the use of the two handsome engravings.



FORTY-STAMP MILL OF THE BERNERS BAY, ALASKA, M. & M. CO.



THIRTY-STAMP MILL OF THE N. G. M. CO., SHEEP CREEK, ALASKA.

ONE of the recent decisions or rulings of the Commissioner of the General Land Office will be received with pleasure by many miners throughout this west half of America, namely: the granting to mining companies the privilege of cutting all the timber they need from the public lands of the United States, provided they follow the instructions of an inspector of the Land office, to be sent upon request, to designate what timber may be cut. It has long been a source of vexation and annoyance to miners everywhere to be restricted by the Government in getting sufficient timber to meet their actual requirements. In many instances miners, individually and corporate, have cut timber in violation of the existing regulations, and have been made defendants in suits brought against them by the Government for indemnity therefor. While wholesale destruction of our forest reserves by miners or anybody else is to be frowned upon, nevertheless, where timber of little value to the Government, but of exceeding necessity to miners in the immediate vicinity, is used, it is good policy every way to place the most favorable construction thereon; and if the new system of permitting the cutting of timber under governmental supervision does not prove too expensive, the concession made by Commissioner Hermann will be of considerable mutual advantage.

IN the issue of Nov. 27th was illustrated and described an innovation in old-time stamp mill foundations, being made in the building of a new 40-stamp mill by G. H. Evans at the Banner mine, near Oroville, Cal. So much attention was attracted by the notice of the replacing of the ordinary timber foundations by concrete blocks that it is of interest to learn, now that the mill is completed, that the new departure is found to be in every way satisfactory. The forty stamps, each weighing 1200 pounds, are dropping 110 times a minute and are crushing four and a half tons to the stamp of quartz ore per twenty-four hours.

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....General Manager

San Francisco, March 5, 1898.

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THERE are 2443 employes in the Department of Agriculture in Washington, D. C. The mineral yield of the nation for '98 will be worth $800,000,000. The prosperity of that industry lies at the base of our national wealth. No one interested in that industry wants 2443 Washington employes to care for it, but many think that it is entitled to one, possibly two.

IT IS PROPOSED to hold in San Francisco in 1900 an international exposition celebrating the fiftieth anniversary of California's admission into the Union. The idea is a good one, but the time is too short to carry out the announced plans on the scale proposed. That there should and will be commemoration of that event is certain, but that the celebration can assume the scope of an international exhibition is more than doubtful.

SENATOR SHOUP of Idaho is securing indorsements for his bill, introduced February 22, relieving silver mines and prospects from the annual assessment work required by law in cases where $1000 worth of work has already been performed upon them. As a temporary relief measure, it is not objectionable, if taken as the suspension of assessment acts in '93 and '94, but it would be a mistake to have such a bill be considered as a permanent policy. Senator Shoup's bill may go through the Senate, but it will have difficulty in passing the House of Representatives in any shape. As a general thing, no one should be relieved of the necessity of doing annual assessment work upon a mining claim until a United States patent is secured.

CONSIDERABLE is being made in the newspapers of Edison's alleged ability to extract gold from low-grade ore in mining camps without the use of water, and coupled with a statement of a recent large purchase of gold ore in New Mexico by him are assertions of what he is "going" to do and the wonderful results that "will be" achieved. While it would be in every way desirable that these extravagant claims were realized, it would seem that the name of the great inventor is being used to conjure with. Edison's wonderful genius has enriched the world with valuable inventions, but it is to be noticed that whenever he has essayed to work gold in black sand, iron in magnetic ore, or any other metallurgical project, the work has (so far as known) not been a financial success. Much of fancy and folly appear in the daily press unfairly attributed to Edison, and this last is open to doubt.

EVERY ESTABLISHMENT in San Francisco capable of supplying vessels for the Yukon trade is busy, and the same may be said of all other coast ports. In addition steam and sail craft are arriving and due from Atlantic ports, and anything that can be utilized is put into service. Several vessels have sailed from Puget sound unfit for service in even smooth inland waters, and much loss of life and property has resulted. The mining fair held in San Francisco during the last few weeks has stimulated the business of outfitters and suppliers for the Klondike trade, and the excitement is still at its height. The result of the present northern hegira will be—apart from terrible suffering and hardship—a general movement out of British territory into Alaska, which will be exploited and advanced a century. The ebb tide of miners and prospectors will aid in the development of the country to the south, and, eventually, California will find successful and unsuccessful alike drifting down, the former to spend their money, the latter to try renewed luck amid more pleasant surroundings.

THE Golden Jubilee Mining Fair closes to-night. Apart from any other effect it has been a good advertisement for California. The receipts and expenses aggregate approximately $75,000, the one item about balancing the other. The first enterprise of the kind in the history of the world, hastily organized, with practically no subsidy, and depending for patronage on the general public, the mining exposition just closed in this city can be counted a success. Even had not a dollar of the thirty-five thousand or forty thousand dollars that it cost been returned in the way of concessions or gate receipts, the expenditure would have been a splendid investment for California. As it is, the management is to be congratulated on having secured at so little cost so great an advertisement of the mineral resources of the State. The Fair covered a period of five weeks, beginning January 29th, and apart from the regular mining exhibit included some "side shows" and attractions which, strictly speaking, had no place therein, but drew the crowd and in that way made the continuance of the entire enterprise possible. It is a matter of regret that the splendid mineral exhibit cannot be preserved intact. Indeed there are many features of the Fair that deserve permanence. The exhibition of mining machinery and appliances was a source of education to many, it being particularly noticeable throughout the entire exposition that that part of the Pavilion devoted to mining appliances in practical operation was constantly thronged. The general result to the merchants and manufacturers of this city is increase of trade and exemplification of what can be done. That there were shortcomings must be admitted in regard to this, as in relation to any other human enterprise, but it is always easier to indicate what might have been done, or what should not have been done, than to improve upon what is actually being done. The management deserve commendation for their untiring efforts by which the city and State benefited.

MR. E. C. BRYCE of Chicago objects to ridicule, and as a prominent manufacturer of gold from the goodness of his heart furnishes the formula used by him in the industry. Mr. Bryce says that all there is to it is the following:

Take of chemically pure antimony five parts; sulplur, ten parts; iron, one part; caustic soda, four parts. Place these ingredients in a graphite crucible and expose to a white heat of 5000 degrees from eight to forty-eight hours. Powder the resulting mass and mix it well to incorporate the metal with slag. Combine this with charcoal, one part; oxide of lead, five parts, and caustic soda, four parts. Fuse the whole until a metallic button is obtained. Scarify and cupola this metallic mass and the resulting lead will be gold and silver.

The simple publication of the above ought to check any further hilarity on the part of the metallurgical world. Nothing more graphic and conclusive can be conceived. There may be some difficulty when it comes to "scarify and cupola," some assayers in their blindness probably attempting to "scorify and cupel;" but little matters like that, of course, are only details. He says the commercial process is now protected, and as the volcanic heat required can only be attained in his furnaces, no mystery is necessary. It has all along been understood that Mr. Bryce's process of making gold was different from that of Mr. Emmens of New York, who compresses silver under cold pressure; and likewise from that of Mr. Marshall of Missouri, who can evolve gold from sulphur and iron without even the trouble of securing antimony or soda, caustic or otherwise. Mr. Bryce also alleges that he is "engaged in the manufacture of ore," which, he says, "yields $1500 to the ton in gold and silver." The whole subject is still discussed in several journals, and correspondence indicates that there is a lingering desire of belief in the minds of many, and a sort of misty hope, that the impossible can come within the realm of scientific discussion. As compared with the men who believe in the statements of the gold manufacturers, the men at present most keenly afflicted with Klondicitis are marvels of sensibly directed energy.

FROM a tunnel company, which announces its business office as being at 131 West Second Avenue, Denver, Colo., is received a handsomely illustrated pamphlet describing its property, and which, (according to the pamphlet) "bears an honest name," which, under the circumstances, is a pleasant thing to know. Some of its contents exhibit two of the most remarkable coincidences in the history of mining properties. On page 17 of the Colorado publication is an engraving of a "vein and stope above a tunnel level" near Ward, Colo. An engraving in this journal of November 6, 1897, showed a vein on the 1400-foot level of the Maryland mine, in Nevada county, California, from a flash-light photograph, which then appeared for the first time in any journal. The engraving referred to on page 17 of the Colorado pamphlet just issued, is precisely the same as that which appeared in the description of the Maryland mine in this State in the issue of this paper of November 6, 1897. In the same issue of the MINING AND SCIENTIFIC PRESS, in describing the vein structure of quartz mines in Nevada county, California, appeared another large engraving, also made from a flash-light photograph, showing the brecciating of a hanging wall in the stope above the 1500-foot level of the Maryland mine, California. On page 23 of the Colorado publication referred to is a picture precisely the same in every feature, and which is, according to the book, "from a photograph taken in the stope of the Ann Arbor vein," Colorado. The description of the cut in the Colorado pamphlet goes on to say that "the ore is not shown the entire width for the reason of its great width, 47 feet. This great body of ore has run all the way from $4 to $1128.58, etc." and goes on to enlarge upon the desirability of immediate purchase of stock in the enterprise. The natural surprise that is occasioned by the knowledge of the fact that every detail of the appearance of the vein on the 1400-foot level of the Maryland mine in California is exactly reproduced in the San Blas vein in Colorado, is enhanced by the exactly alike condition of affairs above the 1500-foot level of the Maryland mine in this State and the stope of the Ann Arbor vein in Colorado: the figures of the men at work, the separation of the vein matter, and every detail being precisely the same in both instances. Indeed, any one uncharitably disposed might say that the pictures in the Colorado publication were an exact reproduction of the California underground mining scenes; and that so far as the Colorado tunnel company—which "bears an honest name"—is concerned, the whole thing is a contemptible piece of theft and misrepresentation, unworthy the name and fame of any Colorado company and deserving of censure.

A CANADIAN contemporary notes the most lavish management in the De Beers Consolidated Mines. The auditors' fees for 1896–7 amounted to $7000, while the directors' fees attained the still heavier total of $77,250. In addition to this the life governor's remuneration for the year came out at $601,825. Donations were presented to public institutions during the year to the amount of $107,695, and altogether the general charges of the year aggregated $464,690. In the twelve months ending June 30, 1897, the diamonds made available for sale realized $11,166,297. The working expenses of the year including $917,075 debenture interest, and $877,620 written off for machinery and plant, were $8,487,690 leaving a balance of $10,162,805, increased to $11,313,150 by the balance brought forward from 1895-6 dividends on investments, rents and miscellaneous items of revenue. Out of the final balance of $11,313,150, dividends were distributed to the amount of $7,897,910, leaving $3,415,240 to be carried forward to the credit of the ensuing year.

United States Mining Laws, and Regulations Thereunder, Relative to the Reservation, Exploration, Location, Possession, Purchase and Patenting of the Mineral Lands in the Public Domain.

NUMBER III.

44. The claimant is then required to post a copy of the plat of such survey in a conspicuous place upon the claim, together with notice of his intention to apply for a patent therefor, which notice will give the date of posting, the name of the claimant, the name of the claim, the mining district and county, whether or not the location is of record, and, if so, where the record may be found, giving the book and page thereof; the number of feet claimed along the vein and the presumed direction thereof; the number of feet claimed on the lode in each direction from the point of discovery or other well-defined place on the claim; the names of all adjoining and conflicting claims, or, if none exist, the notice should so state.

45. After posting the said plat and notice upon the premises, the claimant will file with the proper register and receiver a copy of such plat and the field notes of survey of the claim, accompanied by the affidavit of at least two credible witnesses that such plat and notice are posted conspicuously upon the claim, giving the date and place of such posting; a copy of the *notice* so posted to be attached to and form a part of said affidavit. The plat forwarded as part of the proof should not be *folded*, but *rolled*, so as to prevent creasing, and either transmitted in a separate package or so enclosed with the other papers that it may pass through the mails without creasing or mutilation. If forwarded separately, the letter transmitting the papers should state the fact.

46. Accompanying the field notes so filed must be the sworn statement of the claimant that he has the possessory right to the premises therein described, in virtue of a compliance by himself (and by his grantors, if he claims by purchase) with the mining rules, regulations and customs of the mining district, State or Territory in which the claim lies, and with the mining laws of Congress; such sworn statement to narrate briefly, but as clearly as possible, the facts constituting such compliance, the origin of his possession and the basis of his claim to a patent.

47. This sworn statement must be supported by a copy of the location notice, certified by the officer in charge of the records where the same is recorded, and where the applicant for patent claims the interests of others associated with him in making the location, or only as purchaser, in addition to the copy of the location notice, must be furnished a complete abstract of title as shown by the record in the office where the transfers are by law required to be recorded, certified to by the officer in charge of the record, under his official seal. The officer should also certify that no conveyances affecting the title to the claim in question appear of record other than those set forth in the abstract, which abstract shall be brought down to the date of the application for patent. Where the applicant claims as sole locator, his affidavit should be furnished to the effect that he has disposed of no interest in the land located.

48. In the event of the mining records in any case having been destroyed by fire or otherwise lost, affidavit of the fact should be made, and secondary evidence of possessory title will be received, which may consist of the affidavit of the claimant, supported by those of any other parties cognizant of the facts relative to his location, occupancy, possession, improvements, etc., and in such case of lost records, any deeds, certificates of location or purchase, or other evidence which may be in the claimant's possession and tend to establish his claim, should be filed.

49. Before receiving and filing a mineral application for patent, local officers will be particular to see that it includes no land which is embraced in a prior or pending application for patent or entry, or for any lands embraced in a railroad selection, or for which publication is pending or has been made by any other claimants, and if, in their opinion, after investigation, it should appear that a mineral application should not, for these or other reasons, be accepted and filed, they should formally reject the same, giving the reasons therefor, and allow the applicant thirty days for appeal to this office under the Rules of Practice.

50. Upon the receipt of these papers, if no reason appears for rejecting the application, the register will, at the expense of the claimant (who must furnish the agreement of the publisher to hold applicant for patent alone responsible for charges of publication), publish a notice of such application for the period of sixty days in a newspaper published nearest to the claim, and will post a copy of such notice in his office for the same period. When the notice is published in a *weekly* newspaper, ten consecutive insertions are necessary; when in a *daily* newspaper, the notice must appear in each issue for sixty-one consecutive issues, the first day of issue being excluded in estimating the period of sixty days.

51. The notices so published and posted must be as full and complete as possible, and embrace all the *data* given in the notice posted upon the claim. Too much care cannot be exercised in the preparation of these notices, inasmuch as upon their accuracy and completeness will depend, in a great measure, the regularity and validity of the whole proceeding.

52. The register shall publish the notice of application for patent in a paper of established character and general circulation, to be by him designated as being the newspaper published nearest the land.

53. The claimant, either at the time of filing these papers with the register or at any time during the sixty days' publication, is required to file a certificate of the surveyor-general that not less than five hundred dollars' worth of labor has been expended or improvements made upon the claim, and if more than one claim is included in the application, that an amount equal to five hundred dollars for each claim has been expended by the applicant or his grantors; that the plat filed by the claimant is correct; that the field notes of the survey, as filed, furnish such an accurate description of the claim as will, if incorporated into a patent, serve to fully identify the premises, and that such reference is made therein to natural objects or permanent monuments as will perpetuate and fix the *locus* thereof.

54. The surveyor-general should derive his information, upon which to base his certificate as to the value of labor expended or improvements made, from his deputy who makes the actual survey and examination upon the premises, and such deputy should specify with particularity and full detail the character and extent of such improvements.

55. It will be the more convenient way to have this certificate indorsed by the surveyor-general, both upon the plat and field notes of survey filed by the claimant as aforesaid.

56. After the sixty days' period of newspaper publication has expired, the claimant will furnish from the office of publication a sworn statement that the notice was published for the statutory period, giving the first and last day of such publication, and his own affidavit showing that the plat and notice aforesaid remained conspicuously posted upon the claim sought to be patented during said sixty days' publication, giving the dates.

57. Upon the filing of this affidavit the register will, if no adverse claim was filed in his office during the period of publication, permit the claimant to pay for the land according to the area given in the plat and field notes of survey aforesaid, at the rate of five dollars for each acre and five dollars for each fractional part of an acre, except as otherwise provided by law, the receiver issuing the usual duplicate receipt therefor. The claimant will also make a sworn statement of all charges and fees paid by him for publication and surveys, together with all fees and money paid the register and receiver of the land office, after which the complete record will be forwarded to the Commissioner of the General Land Office and a patent issued thereon if found regular.

PROTEST.

58. At any time prior to the issuance of patent, protest may be filed against the patenting of the claim as applied for, upon any ground tending to show that the applicant has failed to comply with the law in a matter which would avoid the claim. Such protest cannot, however, be made the means of preserving a surface conflict lost by failure to adverse or lost by the judgment of the court in an adverse suit. One holding a present joint interest in a mineral location included in an application for patent who is excluded from the application, so that his interest would not be protected by the issue of patent thereon, may protest against the issuance of a patent as applied for, setting forth in such protest the nature and extent of his interest in such location, and such a protestant will be deemed a party in interest entitled to appeal. This results from the holding that a co-owner excluded from an application for patent does not have an "adverse" claim within the meaning of sections 2325 and 2326 of the Revised Statutes. See Turner vs. Sawyer, 150 U. S., 578-586.

59. Any party applying to make entry as *trustee* must disclose fully the nature of the trust and the name of the *cestui que trust*; and such trustee, as well as the beneficiaries, must furnish satisfactory proof of citizenship, and the names of beneficiaries, as well as that of the trustee, must be inserted in the final certificate of entry.

PLACERS.

60. The proceedings to obtain patents for claims usually called placers, including all forms of deposit, excepting veins of quartz or other rock in place, are similar to the proceedings prescribed for obtaining patents for vein or lode claims; but where said placer claim shall be upon surveyed lands, and conforms to legal subdivisions, no further survey or plat will be required, and all placer mining claims located after May 10, 1872, shall conform as nearly as practicable with the United States system of public-land surveys and the rectangular subdivisions of such surveys, and no such location shall include more than twenty acres for each individual claimant; but where placer claims cannot be conformed to legal subdivisions, survey and plat shall be made as on unsurveyed lands. But where such claims are located previous to the public surveys, and do not conform to legal subdivisions, survey, plat and entry thereof may be made according to the boundaries thereof, provided the location is in all respects legal.

61. The proceedings for obtaining patents for veins or lodes having already been fully given, it will not be necessary to repeat them here, it being thought that careful attention thereto by applicants and the local officers will enable them to act understandingly in the matter and make such slight modifications in the notice, or otherwise, as may be necessary in view of the different nature of the two classes of claims, placer claims being fixed, however, at two dollars and fifty cents per acre, or fractional part of an acre.

SEC. 2333, R. S. Where the same person, association or corporation is in possession of a placer claim, and also a vein or lode included within the boundaries thereof, application shall be made for a patent for the placer claim, with the statement that it includes such vein or lode, and in such case a patent shall issue for the placer claim, subject to the provisions of this chapter, including such vein or lode, upon the payment of five dollars per acre for such vein or lode claim, and twenty-five feet of surface on each side thereof. The remainder of the placer claim, or any placer claim not embracing any vein or lode claim, shall be paid for at the rate of two dollars and fifty cents per acre, together with all costs of proceedings; and where a vein or lode, such as is described in section twenty-three hundred and twenty, is known to exist within the boundaries of a placer claim, an application for a patent for such placer claim which does not include an application for the vein or lode claim shall be construed as a conclusive declaration that the claimant of the placer claim has no right of possession of the vein or lode claim; but where the existence of a vein or lode in a placer claim is not known, a patent for the placer claim shall convey all valuable mineral and other deposits within the boundaries thereof.

62. The first care in recognizing an application for patent upon a placer claim must be exercised in determining the exact classification of the lands. To this end the clearest evidence of which the case is capable should be presented.

(1) If the claim be all placer ground, that fact must be stated in the application and corroborated by accompanying proofs; if of mixed placers and lodes, it should be so set out, with a description of all known lodes situated within the boundaries of the claim. A specific declaration, such as is required by section 2333, Revised Statutes, must be furnished as to each lode intended to be claimed. All other known lodes are, by the silence of the applicant, excluded by law from all claim by him, of whatsoever nature, possessory or otherwise.

(2) Deputy surveyors shall, at the expense of the parties, make full examination of all placer claims surveyed by them, and duly note the facts as specified in the law, stating the quality and composition of the soil, the kind and amount of timber and other vegetation, the *locus* and size of streams and such other matters as may appear upon the surface of the claim. This examination should include the character and extent of all surface and undergrodnd workings, whether placer or lode, for mining purposes.

(3) In addition to these data, which the law requires to be shown in all cases, the deputy should report with reference to the proximity of centers of trade or residence, also of well-known systems of lode deposit or of individual lodes. He should also report as to the use or adaptability of the claim for placer mining; whether water has been brought upon it in sufficient quantity to mine the same or whether it can be procured for that purpose, and, finally, what works or expenditures have been made by the claimant or his grantors for the development of the claim and their situation and location with respect to the same as applied for.

(4) This examination should be reported by the deputy under oath to the surveyor-general, and duly corroborated, and a copy of the same should be furnished with the application for patent to the claim, constituting a part thereof, and included in the oath of the applicant.

(5) Applications awaiting entry, whether published or not, must be made to conform to these regulations, with respect to examination as to the character of the land. Entries already made will be suspended for such additional proofs as may be deemed necessary in each case.

MILL SITES.

63. Mill sites are not mineral entries. On the contrary, the land entered must be shown to be nonmineral. They are simply auxiliary to the working of mineral claims, but as the section granting the right of entry is embraced in the chapter of the Revised Statutes relating to mineral lands, they are therefore included herewith.

SEC. 2337, R. S. Where nonmineral land not contiguous to the vein or lode is used or occupied by the proprietor of such vein or lode for mining or milling purposes, such nonadjacent surface ground may be embraced and included in an application for a patent for such vein or lode, and the same may be patented therewith, subject to the same preliminary requirements as to survey and notice as are applicable to veins or lodes; but no location hereafter made of such nonadjacent land shall exceed five acres, and payment for the same must be made at the same rate as fixed by this chapter for the superficies of the lode. The owner of a quartz mill or reduction works, not owning a mine in connection therewith, may also receive a patent for his mill site, as provided in this section.

64. To avail themselves of this provision of law parties holding the possessory right to a vein or lode, and to a piece of nonmineral land not contiguous thereto, for mining or milling purposes, not exceeding the quantity allowed for such purpose by section 2337, United States Revised Statutes, or prior laws, under with the land was appropriated, the proprietors of such vein or lode may file in the proper land office their application for a patent, under oath, in manner already set forth herein, which application, together with the plat and field notes, may include, embrace, and describe, in addition to the vein or lode, such noncontiguous mill site, and after due proceedings as to notice, etc., a patent will be issued conveying the same as one claim. The owner of a patented lode may, by an independent application, secure a mill site if good faith is manifest in its use or occupation in connection with the lode and no adverse claim exists.

65. Where the original survey includes a lode claim and also a mill site the lode claim should be described in the plat and field notes as "Sur. No. 37, A," and the mill site as "Sur. No. 37, B," or whatever may be its appropriate numerical designation; the course and distance from a corner of the mill site to the corner of the lode claim to be invariably given in such plat and field notes, and a copy of the plat notice of application for patent must be conspicuously posted upon the mill site as well as upon the vein or lode for the statutory period of sixty days. In making the entry no separate receipt or certificate need be issued for the mill site, but the whole area of both lode and mill site will be embraced in one entry, the price being five dollars for each acre and fractional part of an acre embraced by such lode and mill-site claim.

66. In case the owner of a quartz mill or reduction works is not the owner or claimant of a vein or lode the law permits him to make application therefore in the same manner prescribed herein for mining claims, and after due notice and proceedings, in the absence of a valid adverse filing, to enter and receive a patent for his mill site at said price per acre.

67. In every case there must be satisfactory proof that the land claimed as a mill site is not mineral in character, which proof may, where the matter is unquestioned, consist of the sworn statement of two or more persons capable, from acquaintance with the land, to testify understandingly.

PROOF OF CITIZENSHIP.

SEC. 2321, R. S. Proof of citizenship under this chapter, may consist, in the case of an individual, of his own affidavit thereof; in the case of an association of persons unincorporoted, of the affidavit of their authorized agent, made on his own knowledge or upon information and belief; and in the case of a corporation organized under the laws of the united States, or of any State or Territory thereof by the filing of a certified copy of their character or certificate of incorporation.

68. The proof necessary to establish the citizenship of applicants for mining patents must be made in the following manner: In case of an incorporated company, a certified copy of their charter or certificate of incorporation must be filed. In case of an association of persons unincorporated, the affidavit of their duly authorized agent, made upon his own knowledge or upon information and belief, setting forth the residence of each person forming such association, must be submitted. This affidavit must be accompained by a power of attorneys from the parties forming such association, authorizing the person who makes the affidavit of citizenship to act for them in the matter of their application for patent.

69. In case of an individual or an association of individuals who do not appear by their duly authorized agent, you will require the affidavit of each applicant, showing whether he is a native or naturalized citizen, when and where born, and his residence.

70. In case an applicant has declared his intention to become a citizen or has been naturalized, his affidavit must show the date, place, and the court before which he declared his intention, or from which his certificate of citizenship issued, and present residence.

71. The affidavit of the claimant as to his citizenship may be taken before the register or receiver, or any other officer authorized to administer oaths within the land district; or, if the claimant is residing beyond the limites of the district, the affidavit may be taken before the clerk of any court of record or before any notary public of any State or Territory.

72. If citizenship is established by the testimony of disinterested persons, such testimony may be taken at any place before any person authorized to administer oaths, and whose official character is duly verified.

73. In sending up the papers in the case the register must not omit certifying to the fact that the notice was posted in his office for the full period of sixty days, such certificate to state distinctly when such posting was done and how long continued.

74. No entry will be allowed until the register has satisfied himself, by a careful examination, that proper proofs have been filed upon all the points indicated in official regulations in force, and that they show a sufficient *bona fide* compliance with the laws and such regulations.

75. The consecutive series of numbers of mineral entries must be continued, whether the same are of lode or placer claims or mill sites.

POSSESSORY RIGHT.

SEC. 2332, R. S. Where such person or association, they and their grantors, have held and worked their claims for a period equal to the time prescribed by the statute of limitations for mining claims of the State or Territory where the same may be situated, evidence of such possession and working of the claims for such period shall be sufficient to establish a right to a patent thereto under this chapter, in the absence of any adverse claim; but nothing in this chapter shall be deemed to impair any lien which may have attached in any way whatever to any mining claim or property thereto attached prior to the issuance of a patent.

76. This provision of law will greatly lessen the burden of proof, more especially in the case of old claims located many years since, the records of which, in many cases, have been destroyed by fire, or lost in other ways during the lapse of time, but concerning the possessory right to which all controversy or litigation has long been settled.

77. When an applicant desires to make his proof of possessory right in accordance with this provision of law he will not be required to produce evidence of location, copies of conveyances, or abstracts of title, as in others cases, but will be required to furnish a duly certified copy of the statute of limitation of mining claims for the State or Territory, together with his sworn statement giving a clear and succinct narration of the facts as to the origin of his title, and likewise as to the continuation of his possession of the mining ground covered by his application; the area thereof; the nature and extent of the mining that has been done thereon; whether there has been any opposition to his possession, or litigation with regard to his claim and, if so, when the same ceased; whether such cessation was caused by compromise or by judicial decree, and any additional facts within the claimant's knowledge having a direct bearing upon his possession and bona fides which he may desire to submit in support of his claim.

(To be Continued.)

Concerning Certain Physical Theories.

To the Editor:—The most extraordinary absurdity ever seriously believed by scientists is the theory of an ether filling all space and the interstices of matter. Of direct proof there is none. The indirect is the supposed necessity for a means of travel for rays of light, heat, action, sun, electricity, etc., between celestial bodies. I am one of those who believe no such interplanetary rays exist. What seem such to our senses are only some of the protean forms of the one great force which we may, perhaps, call gravitation.

In support of the ether theory, it is alleged to be an axiom that "matter cannot act where it is not." This is an assumption merely. Atoms and molecules of matter do not touch, yet they act on each other, both by attraction and repulsion. The so-called axiom depends on the assumed ether, and two assumptions cannot mutually prove each other. Our ignorance of matter is so dense we should be very guarded in speculation. This ether is thought by some to be matter diffused thinly, but with absolute uniformity—thin space—though means for securing this uniformity have not yet been invented. If matter, it must be subject to gravitation, and every passing planet or meteor would capture some of it and leave either a vacancy or a thin place behind, across which light could not travel. One eminent scientist estimated this matter to weigh 1 lb. for 1,000,000,000 cubic miles. The H. P. transmitted from sun to earth is estimated at about 5,000,000 per square mile of earth. Imagine this force carried from sun to earth in 8 min. by one or two ounces of gas! Lord Kelvin says the ether is an "elastic solid." Others say a "frictionless fluid;" others a "continuum," though what these words mean, no one knows. Brewster, quoted by Tyndall, calls the ether a "clumsy contrivance." Kelvin says it is a "reality of science." The inventors of the ether intended it to transmit the stresses of gravitation, as "matter could not act where it was not."

The pull of the sun on the earth has been estimated at three and one-half million million tons, equal to twenty-two tons per square inch of earth's great inch. The best steel will not safely bear over four tons. The sunpull per square inch on Venus and Mercury would be two and three times that on earth. What of double stars, when two great suns are held together? Suppose Jupiter to fall to the sun. While still 100,000 miles away, the attraction per inch would be 300 million times what it is now on earth. Such figures point to the fact that gravitation cannot be conveyed by a material medium. The direction of gravitational stress is thought to be the same as in a stretched cord, but this can hardly be. If heat travels from its source, the store in that source is diminished. We cannot suppose that the amount of gravitation in any atom can be diminished or taken away, and hence that gravitation is not an emanation and does not travel and hence needs no road to travel on. But let us touch gravitation and the origin of life delicately.

The solar system moves forward rapidly, perhaps five miles per second—thin space. Thus, so far as useful effect on the planets is concerned, not one-millionth of the ether could be of any use at all, and that for only a few seconds thenceforth, thin eternity, useless. The filling of space with ether for the sole purpose of an occasional push to a wave of light is no more absurd than it would be, in order for a lady to take a buggy ride, to pack the whole American continent as full of horses as they could stand, each pushing the buggy a foot or so with his nose. The folly and waste would be no greater.

If the ether is an actual physical something, wherein actual vibrations transmit light, how can such light travel trillions of miles from star to star in straight lines, absolutely straight whether passing thin, cold space or by blazing suns—criss-cross, wave crossing wave in a thousand ways, yet unchangeable, unaffected by gravity, heat, cold, or electricity. Nothing but gravitation has those attributes. If ether is ponderable matter, as Kelvin insists, and vibrates as fast as the wave theory of light calls for, the force required to effect such vibrations is beyond calculation. Kelvin says "such vibrations in steel or brass would be measured by millions and millions and millions of tons' action on a square inch. There are no such forces in our air." Merely to state this is to raise an unanswerable objection to both the ether hypothesis and the wave theory of light. To digress a moment: the latter asks us to believe that a glow worm, whose light in a summer's night may be clearly seen a hundred yards, sets up vibrations beyond the engine power of the greatest ocean steamer, say 18,000 H. P. A candle, if seen a mile, would set in vibration at least three cubic miles of ether. The H. P. is beyond my calculation, and beyond my credulity. There are no such forces in action, and I risk little in maintaining the impossibility, in actual ponderable matter, of any such to-and-fro movement as common theory of light calls for—800 million of millions per second.

The motion of planets and comets shows not the least retardation and proves conclusively that there is no retarding medium in space. To meet this argument, ether was made very tenuous; but the fact of meteors of a few ounces or grains keeping up a velocity of forty to sixty miles per second is too strong an argument for even the thinnest ether. And talk of a frictionless fluid or solid is using words, not ideas, as to talk of matter having four or five or twenty dimensions.

Ether cannot be ponderable and subject to gravitation, else the sun and planets would attract it and absorb it. If they did not, then the ether would pile up in front and develop heat to an enormous degree. If a planet meets stationary ether, does the ether pass then the earth, or turn aside? It cannot be capable of heat or heat expansion, else it would be a very different thing here and in space—a gas in the sun, solid in space, liquid intermediate. If not capable of heat motion itself, how can it convey heat motion? If a continuum, how can vibrations occur without local condensations and rarefactions? How can a continuum be condensed or rarefied? If a tenuous gas, means must be invented to diffuse it equally, else if thick and thin at hazard it would fail of its object, and light rays would surely be crooked. If it diffuses itself by virtue of inherent repulsive forces, it must have balancing attractive forces, else it would diffuse itself endlessly, unless indeed we assume that Nature packed the universe just so full and there is no place to expand into. If it is very tenuous, the atoms must be wide apart. How, then, can they convey anything from one to another if it be true that matter cannot act where it is not. If the atoms be in actual contact, it is, to me at least, absolutely inconceivable how a planet can push them aside, causing two or a hundred atoms to occupy the same space at the same time. Matter to get out of the way of the sun would have to travel from center to edge of sun, 400,000 miles, in a very small fraction of a second—a lively movement.

In short, whatever way we turn we meet difficulties more and more, a dozen for every one supposed to be removed by the hypothesis. Surely a sound philosophy would bid us seek an explanation involving consequences less inconceivable.

Auburn, Cal. W. S. Prosser.

Another View of the Edison Ore Process.

In the issue of Nov. 13th, '97, appeared an extensive technical description of the Edison Magnetic Iron Works at Iron Mountain, New Jersey. Every publication on the Atlantic slope giving the matter any consideration claimed that the practical result of the enterprise would save the region east of the Alleghanies from losing the iron industry. As our readers well know, there is a tremendous battle between the iron and steel industries of that part of the United States and the Lake Superior region. Commercial and industrial supremacy are at stake, and incidentally the industries of Great Britain are in view. In the article referred to full statement was made of the commercial claims that would result from the successful operation of the Edison process. As was to be expected, the Lake Superior region does not view this idea with comfort, and in a letter from Ishpeming, H. J. Stevens in the *American Manufacturer* says:

"There is nothing in the Edison process of iron ore reduction of commercial value. Neither is there anything about the process which is especially novel. This assertion may sound like heresy to those who by reason of his many important inventions have been brought to regard Mr. Edison as a veritable wizard, before whom impossibilities vanish; it is, however, a plain statement of facts well known to the better posted metallurgists of the country. Mr. Edison has been laboring on his process of ore reduction for the past ten years, and nearly a decade ago had a small experimental plant at Humboldt, eleven miles west of Ishpeming, in charge of a Mr. Hussey. Later, Mr. Edison built a small plant at Spurr mountain, Baraga county, twenty-six miles west of Ishpeming, and experiments were carried on in this district for a number of years, the whole work being eventually transferred to New Jersey, where Mr. Edison had meantime secured control of several thousand acres underlaid by large deposits of low-grade iron ores."

The process of iron ore reduction, or the separation of the ore from its accompanying gangue of quartz, jasper, sandstone or other rock, has been the subject of much experimenting in this and foreign countries during the present century. In the Chateaugay ore district of New York, near Lake Champlain, the quartz gangue is removed by crushing and washing. A somewhat similar process has recently been quite extensively tested at the Pewabic mine, Iron Mountain, Mich., with indications of success. The Pewabic is controlled by the Oliver Mining Company of Pittsburg, the corporation which looks after the iron interests of the great Carnegie Steel Company, now the largest manufacturer of steel in the world, the Carnegie Company having succeeded Friederich Krupp of Essen, Germany, in that proud position. The Negaunee concentrating works at Negaunee, three miles east of Ishpeming, Mich., in 1882, at a cost of $200,000, made a failure of the separation of iron ore and jasper, by a process of crushing and separation by specific gravity. The concern turned out a total of 12,618 gross tons of refined ore in four years, although in actual operation for about one year only, at a loss upon every ton, and the loss upon the heavy investment was practically a total one. The Marquette Ore Company sorted over the rock burrows of the Winthrop mines ten years ago, by hand labor, but did not put in machinery for the reduction of mixed ores as was originally contemplated, hence closed its existence with a profit to its promoters. The Republic Reduction Company was organized by wealthy mining men of the copper district, and secured control of the immense rock burrows of the Republic mine, containing over 3,000,000 tons of mixed ore and rock, at a very low royalty upon the ore saved. The best efforts of skilled miners and metallurgists were put in the efforts on this concern during 1888 and the two following years, but the work was a failure, though skillfully performed and with ample capital.

Various methods of ore reduction have been tried in European iron fields with indifferent results or flat failure, the only exception being in the case of the process of Jonas Venstrom of Sweden, who devised a magnetic separator which was patented in several countries, including the United States, some ten years ago, or at about the time when Mr. Edison began his experiments in the same direction. A son of the inventor, Olaf Venstrom, spent several years in this district, and for some time operated a test plant at the Michigamme mine, twenty-four miles west of Ishpeming. The plant was a metallurgical but not a commercial success. The Venstrom process is now in use in several mines of the Gellivare and Orebro iron ore fields of Sweden, where it is giving fair satisfaction. The conditions governing Swedish and American iron mining are so radically different that ore concentration is not likely to prove profitable here until there is an end in sight to the apparently limitless deposits of ore of superior quality now opened in one hundred or more mines in the five great ore ranges of the Lake Superior region.

"The Edison experiments have been closely watched by leading mining men for several years past, as they felt that he could render ore concentration a success if anyone could. Mr. Edison's New Jersey plant is running and is turning out briquettes of a very superior grade of ore, but the ore is costing Mr. Edison more than he can sell it for, and there is every reason to believe that such will continue the case. It is difficult to point out where further economies can be introduced in his process, which is really a marvel of ingenuity, even though likely to never succeed from a financial point of view. The entire work is done by machinery, and the plant is a beautiful one. The work is performed with the utmost economy and skill, but ore can be sold the furnaces at a profit by Lake Superior mines cheaper than the Edison plant can deliver it. The trouble is a fundamental one—there is nothing wrong with the process from a mechanical standpoint, but where ore of a grade equal to the product of the concentrating plant can be scooped out of the ground with steam shovels, ore reduction machinery is baffled. The published reports of the Edison process and works have been somewhat misleading in some respects. It is not true that the big steam shovel at Edison does all the mining. The ore is quite refractory and must be shattered by dynamite, the holes for which are sunk by power drills, previous to loading into cars by the steam shovel. At the leading Mesabi mines the ore is soft and is scooped out of the lode by the shovels without blasting. The ore measures at Edison are extensive, but they are puny indeed compared with the lenses of the Mesabi and even of the other ranges of Lake Superior. One Mesabi mine, the Mahoning, has 75,000,000 tons of ore in sight.

"The sole advantage possessed by the Edison mines and plant is their proximity to the seaboard. The average lake freight from Duluth to Lake Erie ports was but 70 cents per gross ton on iron ore last year, and this rate will gradually be lowered with the increasing capacity of the lake vessels, soon to have a 20-foot channel from Duluth to Buffalo. The tendency of rail freights is also downward.

"Some of the more favorably situated Mesabi mines do the actual mining of their ore for less than 10 cents per ton—one dime more than that covers the total cost for labor, fuel and machinery for digging 2240 pounds of high-grade Bessemer iron ore from the ground and putting it in the railroad cars. There are other costs in connection with the operation of the mines which bring this price up to perhaps 25 cents per ton, but there is more than one Mesabi mine which can put ore on the cars for 25 cents per ton, and the name of those properties which can do the work for 50 cents per ton, or less, is legion.

"Against this simple matter of running a big steam shovel into an open cut and loading perhaps 8000 tons of ore in one day with a single crew, the Edison process calls for power drills and dynamite at the start, a steam shovel next, the handling of the ore repeatedly, its crushing to the fineness of sand, briquetting, drying, and other processes which, even when carried on with the notable economy to be seen at the Edison plant, place the latter at a terrible disadvantage, especially when it is necessary to mine, crush and assort three tons of low-grade ore for every ton of finished briquettes sent to the furnace."

Hult's Rotary Engine.

A rotary engine built by Hult Bros. of Stockholm was awarded a gold medal at the recent exhibition at Stockholm, Sweden. The report of its daily performance is that the engine gives entire satisfaction. During a trial of two hours, forty minutes, the consumption of steam worked out to forty-eight pounds per brake horse-power per hour, which is a good result for a rotary engine.

The engine herewith illustrated is a double one; it has two cylinders, which receive steam alternately, like the cylinders of a locomotive, and hence it has no dead point, the turning effort being fairly constant all around the circle. A most noticeable feature is the great reduction of friction, due to the fact that the cylinder can rotate as well as the piston within it. Heretofore in rotary engines it has been customary to pack the edges of the piston or shutter, and let them rub along the surfaces of the cylinder. In this engine the piston is a roller, and the cylinder is likewise free to roll, the two moving at the same circumferential speed, but not at the same angular velocity, since the cylinder is of greater diameter than the piston. Of course, as in all rotary engines, the piston must make contact with the cylinder at two points, and the second must have a sliding contact. But as the cylinder and the piston are both moving in the same direction at nearly the same velocity, the work lost in friction is not great.

The arrangement of piston and cylinder necessitates large bearings. The friction of these, however, is kept down by the use of roller bearings, the rollers being slightly elastic to take up the wear. There are two such bearings at each end of the engine, one for the cylinder and one for the piston.

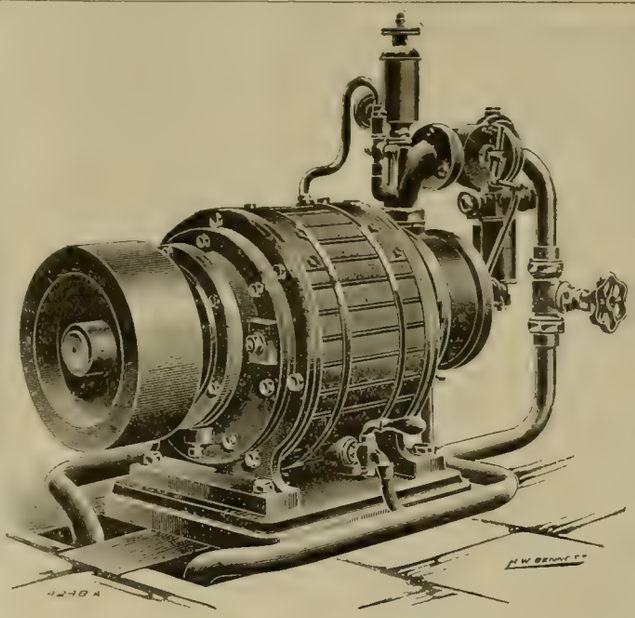


FIG. 1.

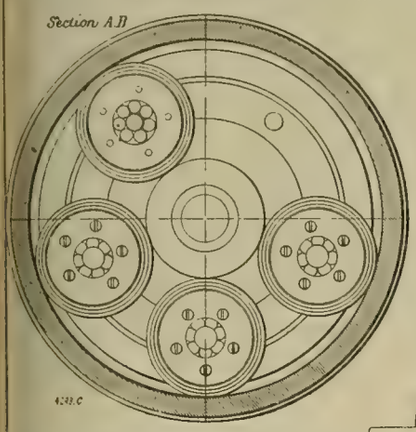


FIG. 3.

Figs. 2 and 6 are sections at right angles to each other of a twin engine. The steam enters at the right hand of Fig. 2, as shown, and finds its way into the central tube, in which there are ports (Fig. 6). It then passes through the passage 2, and exerts a pressure on the shutter protruding from the rolling piston. It will be seen that the upper straight passage has just opened to the steam, while the lower passage 2, which relates to the second engine, has been closed for some time, and that the steam is now expanding in that engine. The two curved passages each communicate with the exhaust, which escapes around the rotating cylinder. It will be understood that each rotating piston runs in contact with the cylinder, and that the latter also rotates. Of course they run on different centers, and the point of contact always remains at the top, as shown. This forms one closed joint and the shutter the other, the expansion of the steam taking place between them.

The rotating pistons each run at one end against the end of the cylinder, and at the other extremity against a loose plate. There are two of these plates in the middle of the cylinder (Fig. 2), and they can be forced apart to take up wear, by pressing wedged-shaped pieces between them by means of screws, as shown. Each piston is, therefore, made steam-tight by rubbing contact over the whole of its ends, while at one part of its periphery it makes a rolling contact with the cylinder, and at another part—the shutter—a rubbing contact which has relatively a very slow motion, since it and the cylinder are moving in the same direction, at slightly different speeds. It will be noticed that Fig. 6 shows a broken section, the right-hand half showing one engine and the left-hand half the other.

The points of cut-off can be varied by rotating the inner tube by aid of the handle shown to the right of Fig. 2. This has the effect of causing the port to be closed earlier or later by the rotating central piece 1. It is by this latter piece the stoppage and reversal of the engine is effected, this operation being performed by the reversing lever shown. When this lever is in the mid-position the tubular piece 1 will shut off the steam channel 2, so that no steam enters the cylinder and the engine is stopped. If the lever be moved to the other end of the segment, the piece 1 will be further turned so that the channel 2 becomes the outlet for the steam, and the channel 3, which previously was the outlet, becomes the inlet. In this manner the engine is reversed. The connection between the reversing lever and the tube 1 is not very clearly shown in the engraving, but it will be seen that there is a link at the bottom of the machine, with a lever passing through the frame at the left-hand end, and operating a rod passing through the central shaft.

There are five sets of roller bearings in the engine, two for the rotating pistons, two for the cylinder, and one at the end where the power is taken off. The piston bearings (Fig. 5) have each a movable roller path, which can be centered by means of screws to bring the pistons into the proper position to bearupon the cylinder. These bearings are on the outsides of the frame (Fig. 2). The cylinder bearings (Fig. 4) have each eleven rollers, and are inside the frame. The remaining set of rollers form both a bearing and a transmission gear, for reducing the speed of revolution. The five rollers run on pins (Fig. 2) projecting from a disk or face-plate (Fig. 3) at the end of the shaft to be driven, each roller having a set of rollers in its eye.

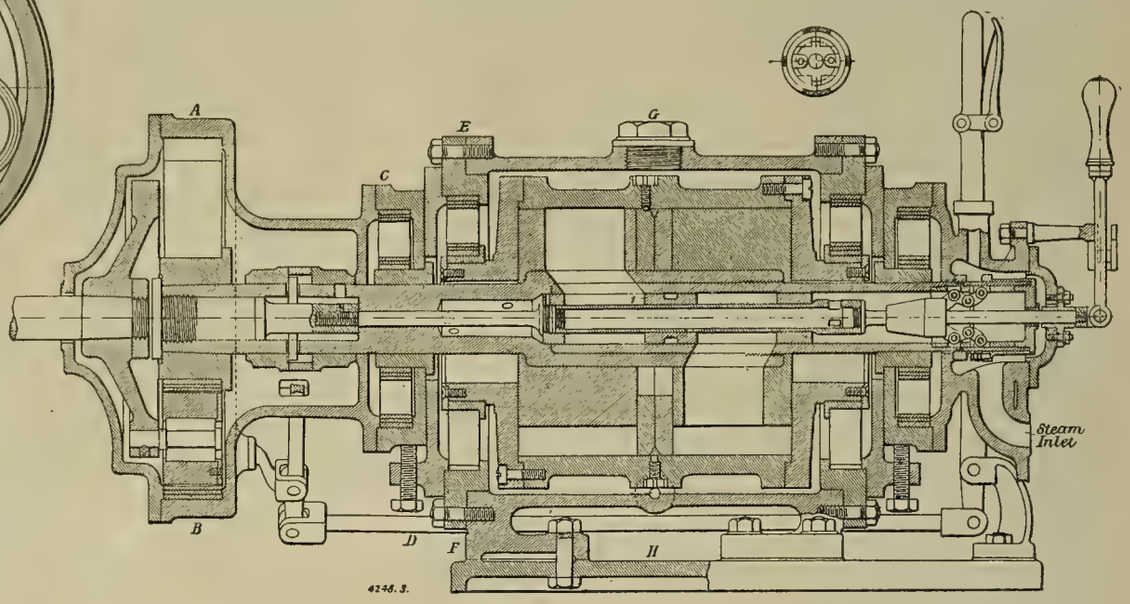


FIG. 2.

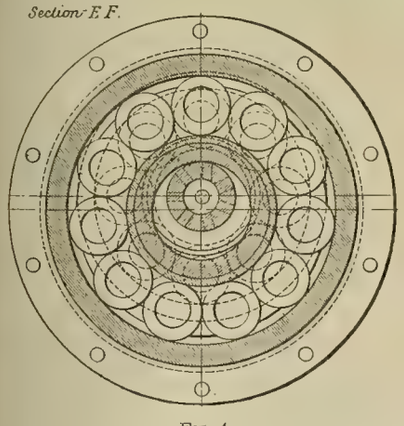


FIG. 4.

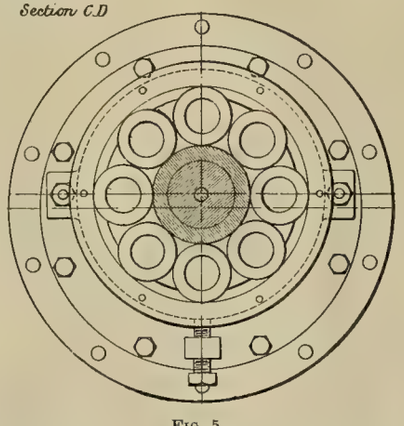


FIG. 5.

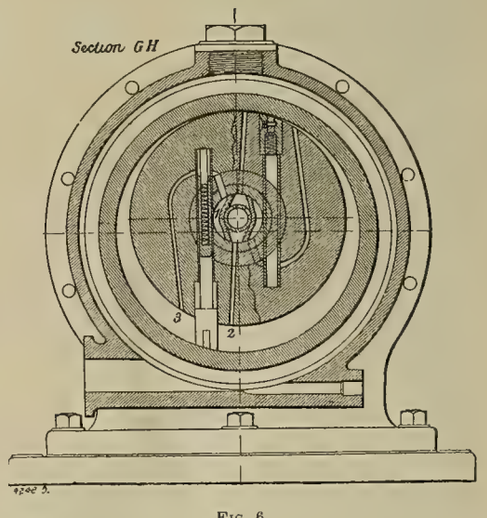


FIG. 6.

The Primary Gold Deposits of the Sierra Nevada.*

By WALDEMAR LINDGREN.

The gold deposits of California extend through the whole State along a north-northwesterly direction, forming a fairly continuous chain. Beginning in the peninsula range south of the Mexican boundary, the deposits continue somewhat irregularly up to Fresno and Mariposa counties. From here northward the gold belt rapidly widens and in latitude 40° extends from the great valley on the west to the summit of the Sierra Nevada on the east. Interrupted for a short distance by a projecting mass of the great lava fields of northern California, the gold belt appears again in Shasta, Trinity and Siskiyou counties and its northerly end reaches the Pacific ocean in Del Norte county, California, and in Jackson, Josephine and Curry counties, Oregon. Volcanic flows and more recent superjacent formations cover the possible extension of the gold belt towards the east and north.

A smaller auriferous belt of less importance follows the eastern slope of the Sierra Nevada, beginning in Alpine county and continuing southward through Mono, Inyo, eastern San Bernardino and San Diego counties. These deposits, less carefully studied and developed than those of the main belt, usually carry, besides gold, a considerable amount of silver. Associated with these are often also deposits of argentiferous galena and of pure, rich silver sulphides.

Many of the deposits in the eastern belt are of comparatively late origin, proved by their occurrence in tertiary andesite or rhyolite.

In the western belt, almost all of the deposits are on good grounds considered of late zurassic or early cretaceous age.

Along the western slope of the range the gold deposits are closely connected with the more or less metamorphosed zurassic, triassic or carboniferous sediments and associated eruptives and may occur in a great variety of rocks. They are absent or sparingly represented in the main granitic areas occupying so much space in the Sierra Nevada.

The contact of the two formations is not characterized by especially rich or abundant gold ores.

This relation is emphasized by the often remarkable change in the old and recent river channels when crossing this contact line. In the granitic rocks they are nearly barren, but rapidly become auriferous when reaching the metamorphic series. Thus, for instance, there are many old river channels in the granitic areas of upper Placer and El Dorado counties, but they are rarely rich enough to work. Along the eastern base of the range a still wider diversity in the occurrence of gold deposits is noted. They occur here with equal frequency in the sedimentary series (probably largely carboniferous), in granitic rocks and in late andesites and rhyolites. Quartz veins in the large granite areas are of frequent occurrence along this belt.

The western belt is characterized by eminently free-milling ores. Below the zone of surface oxidation 60 to 90 per cent of the total gold value is present as native gold, and this relation does not change whatever depth may be attained. Exceptions to this rule are of course found, as in certain veins in Shasta county, etc. In the eastern belt the quantity of free gold is usually less, and below the water level—that is, below the zone of oxidation—the principal value of the ore is more often in the sulphides than in the free gold. It should also be remembered that in the desert region the zone of oxidation extends much deeper than on the comparatively moist western slope where the water level frequently is less than 100 feet below the surface. That the deposits of the eastern belt also contain much silver has already been noted. On the whole, the gold deposits along the eastern part of the range are very similar to the majority of gold veins of Nevada, Idaho and Utah, while those of the western slope find a less illustrious, if older, counterpart in the Appalachian mountains on the opposite shore of the continent.

The following is a preliminary list of minerals occurring in the gold deposits of California:

Gangue Minerals from Vein Filling and Altered Country Rock.—Quartz, universally present; chalcedonite, fairly common; opal, fairly common; calcite, very common; dolomite, very common; magnesite, fairly common; siderite, fairly common; chromite, (?); magnetite, probably secondary; ilmenite, rare; octahedrite, rare; barite, rare; scheelite, rare (Grass Valley?); turmaline, Meadow Lake, Nevada Co.; albite, El Dorado Co., Calaveras Co.; sericite, almost universal; muscovite, common; mariposite, common; roscoelite, rare; talc, occasionally present; chlorite, rare; epidote, Meadow Lake, Nevada Co.; rhodonite, Plumas Co.

Ore Minerals from Vein Filling and Altered Country Rock.—Gold, universally present; electrum, Bodie, Mono Co.; silver, Bodie, Mono Co.; amalgam, rare; pyrite, universally present; pyrrhotite, comparatively rare; chalcopyrite, common; zincblende, common; galena, common; arsenopyrite, common; chalcosite, Plumas Co.; bornite, Plumas Co. and Mono Co.; molybdenite, common; cinnabar, rare; cobaltite, Tioga, Mono Co.; argentite, Mono Co.; proustite, Mono Co.; pyrargyrite, Mono Co.; stephanite, Mono Co.; polybasite, Mono Co.; stromeyerite, Mono Co.; enargite, Alpine Co.; sulphantimonides of lead (not determined), Calaveras, Tuolumne Co.; tetrahedrite, fairly common; tetradymite, rare; altaite, rare; hessite, rare; petzite, rare; calaverite, rare; melonite, rare; cuprite, Meadow Lake, Nevada Co.; chrysocolla, product of oxidation; malachite, product of oxidation; azurite, product of oxidation; hydroxides of manganese and iron, product of oxidation; erythrite, Josephine mine, Mariposa Co.

Classification.—The deposits may conveniently be divided in: Ore chiefly filling cavities—(1) normal fissure veins; (2) crushed zones; (3) joint seams; (4) gash veins and interbedded veins. Ore chiefly altered country rock—(5) metasomatic deposits.

It should be remarked at the outset that this division is not strictly logical, as metasomatic phenomena may and usually do accompany divisions 1, 2, 3 and 4.

This division includes the great majority of producing veins. These deposits occur along fault fissures, which are approximate planes or slightly curved surfaces. The direction and dip may be in any direction, though in slaty rocks it is common to find the strike parallel to the slaty cleavage or to the plane of sedimentation. The dip nearly always differs from that of the enclosing rocks. The ore consists of quartz (with minor quantities of other gangue minerals), containing disseminated free gold and various sulphides (more rarely arsenides, antimonides and tellurides). The country rock adjacent to the vein is usually considerably changed, and in some cases so much so as to be scarcely recognizable, but the division line between it and the pure quartz is nearly always distinct. The country rock next to the vein contains pyrite, arsenopyrite, white mica (sericite), carbonates and small quantities of gold and silver; rarely so much, however, that it can be profitably extracted as an ore. Small seams of rich quartz may, however, permeate it.

As "unusual types" may be segregated a few veins with predominant calcite or barite filling. Both may contain free gold. Still more unusual is the Meadow Lake type, carrying epidote and turmaline, with but little free gold.

In the crushed zones form of deposit there is, instead of a regular vein, a system of branching veinlets and seams following a general direction, but without much regularity in detail. The value of the ore is in the gold contained in the seams and veinlets. The deposit is usually surrounded by a zone of alteration, a few inches or a few feet in width. The whole mass of seams and country rock is usually mined and milled. As an example of this type may serve the Spanish mine in Nevada county. It is hardly necessary to state that this type is closely related to the normal fissure vein, and that all transitions may be found.

Gold quartz is not uncommonly found along joint seams and systems of joint seams traversing the rocks. They consist of a great number of small fissures or cracks, approximately parallel; each individual seam is only continuous for short distances along its strike and dip. The thickness of the quartz along each seam is usually only the fraction of an inch, but it may contain a very large quantity of gold, comparatively. Often there are two systems of gold-bearing seams crossing each other at a certain angle.

The country rock may be slightly altered, but the value of the deposits lies exclusively in the narrow quartz seams. Such seam systems often occur near important vein systems. The joint seams are closely related to the normal fissure veins and, in fact, grade over into them by the prominence and persistence of particular seams.

As examples may serve the seam diggings N.W. of Georgetown, El Dorado county, and Red Hill, one mile west of Nevada City.

Gash veins are deposits filling fissures of generally irregular form and short lateral and vertical extension, supposed to have their origin in tensile stresses. No faulting has thus taken place along them.

Interbedded veins are deposits filling openings between strata and strictly parallel to them. Such openings would most readily be caused by plication and are naturally limited in their extent.

It is clear that these forms of fissures would be likely to accompany any strongly compressive movement such as is believed to have caused the normal fissure veins, and they have in fact often been noted on a small scale by the writer, especially in slaty rocks. Still, it would be difficult to name any one deposit of economic value along the Sierra Nevada which undoubtedly belongs to either of these classes. It is evident that, according to the classification here adopted, a vein filling a distinct fault fissure, though parallel to the dip of the schistosity or the strata, would not be considered as an interbedded vein.

In the purely metasomatic deposits there is no clearly defined fissure or seam systems along which the ore is found. On the contrary, they consist of an irregular zone of intensely altered rock which contains gold and silver and forms the ore.

To this type belong certain deposits in andesite along the eastern slope of the range scattered from Nevada to Alpine county, and most abundant in the latter. The Oro Fino mine, El Dorado Co., and many deposits in Shasta Co. offer other examples, but on the western slope it is not a usual type.

The metasomatic ores generally contain much silver, besides gold.

As stated above, metasomatic ores may be found adjacent to any fissure veins, though they are rarely of high grade. On the other hand, seams and veinlets may be found in even the most typical metasomatic deposits, indicating that there is no well defined line between the two classes.

Origin of Gold Deposits.—The careful investigations thus far made lead to the conclusion that normal fissure veins, crushed zones and joint systems are caused by compressive stress. By examining a number of mining districts it has been found that the arrangement, dip and strike of the fissures correspond, more or less exactly, to the calculated results of compressive stress applied to a homogeneous material. Thus, one of the most common conditions is that of a series of veins parallel in strike, but with dips in opposite directions, forming a "conjugated system" of fractures.

It has further been shown that no sharp line can be drawn between large and small fault fissures. The joint seams (sheeted zones), so commonly found, consist simply of a number of very small fault fissures.

All fissures are limited in lateral and vertical extent; but some go down much farther than others.

The white and milky normal vein quartz is, beyond all reasonable doubt, a vein filling deposited in open spaces by hot mineral water containing silica. This has been fully discussed and explained in many recent publications. When the quartz is flinty, greyish or greenish, cellular and showing evidence of pseudomorphic deposition, further investigation is necessary to determine its origin.

The solution depositing the quartz contained, besides silica, a high percentage of alkaline carbonates in which gold and sulphide ores are soluble. From these supersaturated solutions silica was deposited by reason of slight variations of physical or chemical conditions, and with the silica much of the gold was probably mechanically deposited. In the same manner the soluble sulphides crystallized out, and with them, according to well-known laws of affinity, also much gold.

During late years the importance of metasomatic processes for the theory of formation of mineral deposits has been fully recognized. But as often is the case, some of the champions of this mode of origin have applied it indiscriminately to everything, not fully realizing the character of the process involved.

Metamorphism means the conversion of one rock into another of different structure, texture or mineral composition, or all these, while its composition remains approximately the same—limestone to marble, clay slate to mica schist, etc.

Metasomatism means the conversion of one rock or of an aggregate of minerals into another of wholly different chemical composition. The form, structure and texture of the original rock or mineral may also be wholly changed. (Pseudomorphs of minerals may result from metasomatic action, but in pseudomorphs the original crystal form of the mineral is preserved.)

As examples may be cited the conversion of calcite into galena, known from many deposits in limestone. Metasomatic action, however, rarely involves a complete change. In many cases one or more of the elements in the original mineral is retained in the new combination; in a rock some of the minerals may be wholly or partly changed by metasomatic processes, while others are not affected.

Substitution and *replacement* are terms used by some writers (the author included) as the exact equivalent of metasomatism, while others have used *replacement* to indicate a complete metasomatism, as galena from calcite, and *substitution* to denote a partial metasomatism, as calcite and pyrite formed from hornblende.

Chemical action generally takes place between the solvent and the original body. Metasomatism by simple dissolving and deposition *paripassu* is also possible.

Cementation, which must be strictly distinguished from metasomatism, consists in the filling of cavities, or, in general, interstitial space, by deposition from solutions. Chemical action is not involved here. As example may be cited deposition of silica in sandstone, tuff and other porous rocks, this kind of silification being often noted near veins in such rocks; further, the filling of an extensively crushed rock mass by quartz deposited in cracks and seams.

From the definitions it is clear that the intensity of metasomatic action depends on the intensity of chemical action between solvent and body acted upon. Thus easily soluble rocks like limestone will easily fall a prey to metasomatism, while silicates are much more resistant. Coarse and basic rocks (diabase,

*Stanford Journal.

gabbro, serpentine, etc.,) will be more easily affected by mineral solutions usually occurring in nature than fine-grained and silicious substances.

The processes to which sedimentary and igneous rocks close to the veins have been subjected result in the formation of white micas (sericite, more rarely mariposite or roscoelite,) carbonates of calcium, magnesium and iron, together with pyrite or occasionally arsenopyrite, all these minerals replacing the feldspars and the ferro-magnesian silicates, and to a less extent the quartz. It is therefore a partial metasomatism. Any one of the resulting minerals may locally preponderate. In certain rocks like diabasic or serpentine the carbonates form especially abundantly and easily, and by this process large masses of dolomitic vein material may result. The "dolomite," near the mother lode, is believed to have resulted in this manner. Very characteristic for this process is the elimination of sodium from the rocks and the accumulation of potassium chiefly contained in the white mica or sericite. Kaolin is a comparatively rare product, the white "talcose" masses generally regarded as kaolin or talc being, as a rule, composed of finely divided sericite. This *sericitization* seems characteristic not only of the gold quartz veins of the Sierra Nevada, but also of many recently investigated districts in Idaho and Colorado.

A silicification by metasomatic processes is only recognized to a very limited extent. On the contrary, silica has generally been extracted from the wall rock and deposited in the open spaces. Indeed, the tendency of the silica to deposit in open spaces, if such exist, is quite remarkable. Replacement of silicates by silica, wherever recognized, is characterized by fine-grained and crypto-crystalline aggregates. It is generally very easy to recognize a silicified rock, for it never has the characteristic coarsely crystalline structure of that deposited in open cavities. When the "vein stuff" consists of carbonates it behooves one to be very careful in its classification as filling or metasomatic product, for carbonatization easily takes place and may change the original character of the rock to an amazing degree.

In purely metasomatic deposits the changes involved are similar to those just described, but in the absence of open spaces the silica is often deposited within the rock, usually forming jaspery and flinty masses mixed with the remainder of other minerals. Streaks of "talcose slates" forming low-grade ore bodies have been noted from various parts of the western slope. Some of these, such as the Boss mine, near Sweetland, Nevada county, are simply sericitized schists filled with pyrite. The latter contains some gold which is set free in the surface zone of oxidation. Other deposits of this kind appear to be true talc schists, and Turner describes one from Mariposa county containing, besides talc, dolomite, free gold, auriferous pyrite and itmenite. Such a deposit must be characterized as very unusual.

As noted above, the metasomatic wall rock has, in the case of fissure veins, rarely absorbed a very large percentage of gold and silver, so that its economic value is not great unless containing many quartz seams rich in gold. From investigations thus far made it appears that the permeability of these altered wall rocks is greater for silver than for gold. For while it is exceedingly common to find silver ores, economically valuable, result from the alteration of the country rock, both near veins and near limestone deposits, by far the largest percentage of gold ores occur as pure filling of cavities.

The character of the processes here outlined depended in the first place on the composition of the thermal waters causing the deposit, and as that composition varied so will the products of metasomatic action. The great similarity in the alteration in gold deposits show that their thermal waters must have had a very similar composition.

In deposits varying greatly from those here described a different series of metasomatic products will probably be found. Much remains to be done in this line of investigation. The exact process of alteration in the great thermal zones of Alpine county and adjacent parts of Nevada, for instance, offer an attractive field for research.

W. A. FARISH, who returned recently from Honduras, says he had a hard time of it there. "Sometimes we were wading in swamps twenty-four hours at a time, and from first to last it was one of the most disagreeable trips that can be imagined. The mines that I went to examine are on the west side of the range, and were worked by the Spaniards from the discovery of the country until they were driven out in 1821. Since then there has been very little done, and the old workings still remain there. The mines were very largely worked by open cuts, and these stand up sometimes over 100 feet. One reason why nothing has been done is that there has not been the requisite capital. A native company undertook to cut the workings of one of these old mines and ran a tunnel of nearly 2000 feet, only to find that they were still above the lower workings. The pillars of ore were taken out and shipped to San Francisco, and enough was realized from the sale of the ore to pay all the expenses of running the tunnel with a very handsome margin for profit. This gives some idea of what may be done with proper development in accordance with modern ideas. The gold belt in that country is about a mile and a half wide, and traverses the entire country. The country rock is andesite porphyry, and there is no reason why it should not pay handsomely when operated systematically and economically."

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER VII.

By GEO. F. BECKER.

If the solutions rose through "rake veins," they would permeate all accessible permeable strata and partings. Now, it seems to be generally assumed that a conglomerate without matrix would be much more permeable to fluids than a sandstone. This is true if only rapid currents, such as might be impeded by fluid friction, are to be considered. There is no probability, however, that ores are deposited from rapid currents. For slow currents fluid friction is a vanishing quantity, and then the permeability of a given rock may be considered as measured by the interstitial space. Now, the interstitial space in a conglomerate composed of pebbles of various sizes is really less per cubic foot than that of a fine but even-grained sandstone. If the material is of absolutely uniform grain, the interstitial space is wholly independent of the size of the component particles, and cannot fall below 26 per cent. It is a fact well known to millmen that a cubic foot of sized tailings weighs less than a cubic foot of unsized tailings. Sandstones used for building in some cases contain over 20 per cent of voids, and highly indurated sandstones contain 4 or 5 per cent.

It follows, then, that the sandstones as well as the conglomerates should have been impregnated when soaked in an auriferous solution, and to approximately an equal extent, while as a fact the sandstone does not contain one one-thousandth part of the gold. The impregnation theory would, furthermore, seem to involve the presence and the prevalence of chutes in the banket. There is no doubt that most of the gold occurs in patches which are distinctly different from chutes, and many engineers are confident that real chutes are absent. Much of the pyrite is in the form of minute water-worn pebbles, and much of the gold is inclosed in the pyrite, indicating a common origin for the two minerals. This fact is regarded by De Launey as fatal to the impregnation theory, and, indeed, it seems impossible to reconcile this mode of occurrence with the hypothesis.

The strength of the impregnation theory lies in the fact that some of the gold and of the pyrite appears to be crystallized, as if deposited in place. A portion of the observed phenomena seem certainly secondary. Below water level, or "in the blue," visible gold is very rare on the Rand. In the oxidized upper levels it was much more frequent, and free gold was found in the cavities from which pyrite had disappeared by oxidation. This is, of course, a very common phenomenon at the croppings of auriferous deposits, and can be accounted for only by the recrystallization of gold attending the oxidation of pyrite. The modus operandi is also pretty clear. Iron sulphate is a weak solvent for gold, and iron sulphate is one of the products of decomposition of pyrite. Recrystallization is a process which goes on in the presence of weak solvents. Recrystallization of rock components is a very common thing, and the ordinary phenomenon called metamorphism is substantially recrystallization. The quartzite walls of the Main Reef are in part recrystallized sandstones, and recrystallization of silica has certainly taken place in the banket. Some recrystallization of gold and pyrite in the blue may very probably have occurred as an incident to general metamorphism or to the formation of the white veins. Hence the impregnation theory is not the only one which will account for the state of one portion of the gold and pyrite, and the fact that it could explain this state is insufficient to outweigh the many objections to the theory.

On the whole, then, it appears to me that this theory is untenable. It is popular with engineers accustomed to quartz veins, partly because it involves a close analogy between the Rand deposits and the more familiar type of gold deposit.

Precipitation Theory.—The theory maintained by Mr. De Launay in his latest work is that the sea in which the banket was deposited was a saturated solution of gold and pyrite. These minerals were precipitated as the banket accumulated, a part of the pyrite being at the same time waterworn. This theory is an elaboration of Mr. Penning's. It avoids some of the objections to the impregnation hypothesis. The absence of rake veins and well-marked chutes is consistent with the scheme of Messrs. Penning and De Launay, and it would account fairly well for the patchiness of the reefs. Mr. Penning was driven to it by the angularity of the gold; Mr. De Launay, by the supposed importance of the rarity of gold in the pebbles.

The precipitation theory, however, is by no means free from objections, chief of which is that it gives no account of the most important feature of the deposits, namely, the association of gold in largest quantity with the coarsest banket. One would expect to find the sands at least as much mingled with the auriferous precipitate as the banket. Precipitates are usually thrown down in a fine state of division. How is it, then, that the currents which swept away all mud and fine sand did not also carry off the crystals of gold and pyrite before they had time to reach considerable dimensions?

Mr. De Launay supposes a relatively quiet deposition of gold and pyrite from sea water in unsorted material, followed by a natural concentration. Now, sorting begins the moment that detritus from the land reaches the sea. I perceive no opportunity for the supposed quiet precipitation of gold and pyrite; nor do I understand why precipitation, if it takes place at all, does not continue during the sorting process, so that the sands eliminated from the pebbly material would continue to be enriched by precipitation.

The fundamental hypothesis of a sea highly charged with gold and pyrite seems to me extremely improbable. Had the ocean at any time been so charged, the mineral would, as Mr. De Launay says, be precipitated with extreme ease. How, then, could the ocean become highly charged? It would seem that the gold and pyrite going into solution, say at the mouth of some submarine solfataric vent, must be thrown down almost immediately and close to the point at which solution took place. An almost uniform distribution of gold along a coast known to be at least thirty miles in length would then be impossible. Again, if the ocean ever was so powerful a solvent for gold, why are there not many and indubitable cases of deposits formed by this method?

The advantages of the precipitation theory over the simple detrital theory are, as I understand Mr. De Launay, that the former hypothesis explains why there is no gold or pyrite in the pebbles and why the gold is not substantially all on the foot wall of the reefs. These advantages are by no means substantial ones, as will presently appear.

Marine Placer Theory.—As has been noted above, pebbles which carry crystallized pyrite and other sulphurets disseminated through the quartz, and not on fissures of any sort, are fairly abundant on the Rand. Gold is also known in the pebbles. Some writers consider it very strange that if the pebbles came from auriferous quartz veins gold-bearing pebbles are not more abundant. As a matter of fact, in the auriferous river gravels of California and Venezuela pebbles showing visible gold are extremely rare. Even in the vast exposures of the hydraulic washings one might spend weeks in the vain search for a specimen. In the sluices, however, small pieces of auriferous quartz may be found with the gold, separated by the concentration process from thousands of tons of barren pebble. On the auriferous beaches of California, Oregon and Alaska such pebbles seem to be still rarer than in the river gravels. Thus the rarity of gold-bearing pebbles on the Rand is such as should be expected from analogy if the deposits belong to the class of deposits.

The presence of crystallized gold and pyrite is by no means unaccountable on the same theory. Even in the Tertiary gravels of California recrystallization of sulphurets is now in progress, and it is probable that recrystallization of gold also has taken place to some extent. On the Rand it is certain that solutions capable of dissolving gold to some extent have been present below water level at some time since the original deposition. These accompanied the formation of the white quartz veins which cut the banket beds and which occasionally carry a little gold. The same solutions must have been capable of dissolving pyrite. The solvent fluids were probably hot waters containing sulphides of the alkalies and carbonates. Such waters dissolve gold and sulphurets, and they almost invariably accompany eruptive activity such as is manifested in the dikes of the Rand. Now, recrystallization being due to the action of fluids which exercise a feeble solvent power, it would be extremely remarkable (taking the existence of the white veins into consideration) if the gold and pyrite of the banket showed no evidences of recrystallization. It is quite as easy to account for recrystallization of the gold and the pyrite as for the conversion of the sandstone into quartzite.

The objection to the theory under consideration that the gold is not uniformly found on the foot wall of the reef is entirely without weight. In auriferous *river* gravels, indeed, most of the gold is found either on bed rock or on layers of pipeclay; but the banket is not a river deposit. As has been explained already, river gravels are distinguishable both by the form of the pebbles and by their imbrication or "shingling" from marine gravels, to which class those of the Rand belong. The deposits are, therefore, comparable with the auriferous beach deposits of the Pacific coast or New Zealand, and not with the river gravels of the Sierra Nevada. In the beach gravels the gold is found at the bottom of the layer of material set in motion by the last wave or current by which the mass has been agitated. Hence the beach deposits consist of stratified masses of gravel and sand, in which the gold is for the most part confined to those layers which are composed of heavy particles.

(*To be Continued.*)

*Eighteenth Annual Report Mineral Resources of the United States.

Wingdams.

Written for the MINING AND SCIENTIFIC PRESS by R. L. DUNN.

River bed mining for gold by what are called "wingdams" is a method of placer gold mining in common use in California. It is employed in mining the water covered beds of large rivers where it is impracticable or undesirable to divert the water from the entire bed. A wingdam is a dam which extends out from one side of a river part way across the stream, crowding the full flow to the unobstructed side. It usually is built out about half way across then turned down stream and parallel to the bank till it includes within it the portion of the river bed it is intended to mine, then, turning toward the bank of the river it started from, it completes the enclosure tight against inflow from the river. The dam is usually temporary in character, intended for a season's use only during the low water season. Only so much ground is included as it is estimated can be worked out before the rising waters of the wet season overwhelm and tear out the dam. Construction and operation generally proceed as follows: After the high water of spring subsides and as early in the dry season as possible, the work is commenced by the construction of the head wingdam. This is located at the upper end of a riffle in shallow water. Two parallel walls of large rocks or cobbles are built out from the shore from 6 to 8 feet apart and the inner space between filled in with gravel, sand and clay. The filling is made as near as practicable water tight and the walls so constructed as to protect the filling from the wash of the current. At the middle of the stream the walls are turned down stream and with the filling continued parallel to the shore till the desired area is enclosed, then the walls turned again are built to the shore, making the tail dam. This last dam is located on a riffle, if convenient. This is the simplest form of wingdam construction. In rivers with strong currents and large flow of water, cribbing is sometimes employed to strengthen the head and mid-stream dams and the latter are faced with inch plank as a protection against the stream wash. The mid-stream dam in particular requires attention as the confining of the stream to half of its width materially increases its velocity and consequent eroding energy. The enclosed area of the dam is full of water which is cleared together with sipage water by pumps. In the simplest form of construction the power for pumping is obtained from a current wheel operated by the river flow. The diameter of such a wheel is from 10 to 14 feet and its length of paddles 8 to 20 feet. The shaft is a single stick of square timber 12 to 16 inches square. The ends are rounded and protected by iron rings. Into the ends are set 2½ to 3-inch gudgeons on which the shaft turns in oak boxes set on movable pillow blocks so that the wheel can be raised or lowered by levers to meet the natural variations in the stream flow. The wheel is set outside the mid-stream dam so that the current impinges directly on the buckets where necessary a wingdam being built out from the opposite side of the river to direct the current. The wheel is set at the lower end of the enclosed area. Between the wheel and the inside pillow block is a wooden drum about 3 feet in diameter. From this wood pulley a wide belt transfers the power to the pump shaft, a square timber of similar size to the wheel shaft. The pump shaft actuates what is known as a Chinese pump. This is an inclined box made of 1½-inch lumber, 16 to 30 feet long. Through this box runs a belt, 12 to 24 inches wide, according to the water it is required to handle. Fast to this belt are paddles 3 to 6 inches deep, but all alike and with the belt just filling the box. On the pump shaft is a wood pulley and fast at the lower end of the box a second wood pulley. Over these two the belt is carried and through the box. Applying the power from the water wheel a continuous stream is lifted through the box and discharged by a box over the dam. Such a pump will lift considerable volumes of water from 12 to 20 feet and they have been successfully worked to a lift of 30 feet. This style of pump is the simplest and cheapest for the work and two or more can be operated in the same mine should one prove insufficient. In place of it there can be employed centrifugal or steam pumps or hydraulic elevators and water lifts. The circumstances of each particular operation would determine whether or not the employment of any one of these substitutes is economical. Generally speaking none of them are economical. With the pump in place the mining proper commences. The water is pumped out. A sump is commenced at the lower end of the pump so that the drainage of the entire area comes to it. Including the sump is commenced the excavation of a pit to the bedrock though the loose sand and gravel of the exposed river bed. The ordinary placer mining methods are followed from now on, the exposed river bed being a placer with deficient dump and subject to the condition of pumping to admit of working.



S. & L. B. T. CO.'S BOARDING CAMP.



CAMP NO. 2 S. & L. B. T. CO.



TRACK LAYING.



PIECE OF COMPLETED TRACK.

Improving Klondike Transportation.

As was to be expected, the rush to Klondike and the Yukon region has stimulated unusual activity in overland transportation facilities. A year ago there was very little in that direction, but now ingenuity is taxed in devices for getting up there quicker and easier. Two wire rope tramways are in course of construction, railroads are projected, and if half of what is said is to be given serious consideration, in another year it will be as easy to ride to Klondike as it is in many regions that have be settled for a quarter of a century. Among the many projects for carrying freight and passengers devised by those who rightly judge that there is as much present money in the carrying trade as there is in getting out gold is the Skaguay & Lake Bennett Tramway Company, which is building a pole tramway from Skaguay to the international boundary and thence to Lake Bennett. The company's officials say that they can build it for about one-fourth what a narrow gauge road would cost; that its carrying capacity will be about one-third of a narrow gauge road and about twelve times that of a wagon road, and that when completed they can carry freight from Skaguay to Lake Bennett in twelve hours. The accompanying engravings give a good idea of the appearance of the country, progress of the road, etc. Another pole tramway is being built around White Horse rapids—that short but dangerous piece of water on the route down the Yukon.

Experimental Slimes Plant.

The South African *Mining Journal* describes a small plant of the Clancy and Russel process for the treatment of slimes, which consists of two superimposed buoy-shaped conical vats of 300 gallons capacity each, capable of treating about four tons of slimes per twenty-four hours. The slimes, which have been experimented upon, contain about 2 per cent of dried slime. This particular treatment is based on the quality of the content introduced and mixed with the slimes, so that a 4 per cent quantity of slime pulp could as easily be treated as that which is now being supplied.

The prominent feature of the plant is that pulp is

introduced at the bottom of the inverted cone-shaped tank, with sufficient head of pressure regulated to ensure a gentle flow into the vat. The slimes pulp being introduced under the head of water prevents the slimes from rising, and to obtain an equal distribution a bell-shaped distributor is fixed inside the vats over the intake pipe. The excess water flows away from the top of the vat in a clarified condition, and can be returned to the battery for use. An internal launder regulates the steady flow of the excess water from the vat to the discharge pipe, preventing any unequal draught in the discharge current. The separated or concentrated slimes are drawn from the bottom of the cone and forced up three feet of discharge pipe. They are then run into a mixing chamber, built between the two vats, and into which a weak cyanide solution is turned, so that the slimes and solution come into equal contact at one end of the chamber. The mixture is then agitated by compressed air, introduced in the middle of the chamber. The present contact is of about fifteen minutes' duration, but can be regulated by the size of the chamber. The mixture is then run into the lower tank, again from the bottom of the inverted cone, and the operation of separation repeated. The solution is then run off into boxes for treatment in the ordinary manner, and the residues discharged to the waste dump. The slimes now being treated are of 3½ dwt. value, and the extraction claimed is 81 per cent, the washed residues only containing 16 grains. The process can be worked almost automatically, the local estimates for a plant capable of dealing with 150 tons of slimes per diem being about $30,000.

Fatigue of Metals.

Two years ago it was announced at a meeting of the American Institute of Mining Engineers that cast iron when subjected to long and continued shocks or vibrations increased in strength, the explanation being given that the gain in strength is due to the release of internal cooling strains, owing to a rearrangement of the molecules under the influence of shock. This is, in effect, a process of mechanical annealing analogous to annealing by heat. Upon a testing machine over 1000 test bars were broken, one-half of which had been subjected to shocks or vibrations in a revolving iron barrel; the other bars, cast in the same molds and from the same metal, were not so treated. In all cases the bars that had been subjected to shock were found to be stronger than their companions, the average being over 10 per cent, and the maximum gain, as shown in the published tables, being nearly 20 per cent. This statement excited wide notice in this country and Europe. The tests were repeated by expert iron masters everywhere, and the experiments subsequently published by many observers not only corroborated the original statements, but the records of these independent investigations in most cases far exceeded the original claims.

The Franklin Institute committee made a great number of tests, showing large gains in most cases, and the maximum gain in strength exceeded that of the original record by more than 100 per cent. The investigations of the committee extended over a period of more than a year, and no evidence was offered, or found after prolonged search, indicating that such tests had ever been previously made. On the contrary, these experiments explained for the first time the certain peculiar and heretofore mysterious physical properties of cast iron.

It has long been thought that iron castings improved by age, and over thirty years ago, Sir Frederick Bramwell, then the director of the metallurgical work at Woolwich Arsenal, England, found that some old cast iron guns recently tested by him were immensely stronger than precisely similar guns made and tested within thirty days after having been cast. "Tests to destruction" of both the old and the new guns were then ordered to be made, and it was found that a gun which had been kept for sixty years before being tested endured 800 discharges before it burst; another gun, kept the same length of time, did not burst after having been subjected to 2582 discharges. Sir Frederick Bramwell reported in 1860 that "guns of the same description tried thirty days after casting burst, one at the 84th and one at the 72nd discharge." "This result," said he, "showed that it was not impossible that the superior manner in which guns cast some years ago but recently used stood their work as compared with those of modern make was not due, as was commonly supposed, to the better quality of the metal used in those days, but to their having been cast a long time, and to the strains that existed in them, from unequal contraction when originally cast, having ceased, while the strains in the new guns were exerting a prejudicial effect."

The recent discovery, so fully corroborated by the Committee on Science and Arts of the Franklin Institute, proves the correctness of these assumptions. But it does much more than this. The tests not only measure quantitatively the force and value of these internal strains in cast iron, but the important discovery has been made that such strains can be quickly removed by subjecting castings to shocks or vibrations. Steel and forged iron are inherently different metals, and are differently treated from cast iron in the process of manufacture. It is, therefore, not incomprehensible that the effect of vibration upon steel and iron is to cause "fatigue," and consequent weakening, of the metal. Lord Kelvin thirty years ago directed attention to the fact that iron wires kept in torsional oscillation during the week behaved quite differently after their Sunday's rest, and it has recently been shown that owing to molecular rearrangement which occurs during rest in an overstrained bar the "modulus of elasticity" will rise 10 per cent, after three weeks holiday. This remarkable statement was made by Sir Benjamin Baker in his presidential address two years ago at the meeting of the English Institute of Civil Engineers.

It is naturally to be expected that many facts are still to be learned about the physical qualities of steel, because its application to very large engineering work is of comparatively recent origin; but it was said at the meeting of the mining engineers two years ago that it was long thought that practically all properties of cast iron were known, and that the discovery of a hitherto undetermined law of the physics of cast iron at this late day was, therefore, a complete surprise to the metallurgical world. The Franklin Institute committee in its report says:

"The principal result has been to largely upset some of the generally held ideas on the subject of cast iron, and where formerly it was considered essential that small or light castings must be protected from shock, it is now believed that they may be generally strengthened and relieved of their internal cooling strains by judicious treatment in this way."

Recent specifications for certain castings required to be made of iron of guaranteed strength contain a new clause stipulating that the test bars must not be subjected to shock in a tumbling barrel or otherwise have their strength increased by mechanical vibrations. A practical result of this investigation will be to give increased confidence in the use of cast iron for structural and other purposes where the metal is subject to vibrations of moderate shocks.

Recently Declared Mining Dividends.

Raven, Colorado, 1 cent per share, $10,000; March 1.

Lillie, Colorado, 1 cent per share, $9000; March 1.

Standard, California, 10 cents per share, $30,000; March 1.

Swansea, Utah, 5 cents per share, $5000; payable March 10.

Ruby, Montana, 2 cents per share, $6000; payable March 5.

Personal.

H. C. WOODROW is Supt. Lightner mine, Angels, Cal.

P. ROWE becomes Supt. Bell mine at Tuttletown, Cal.

J. CHESTNUT has returned to Oakland from Tuolumne Co., Cal.

F. P. KING is the new Supt. Blue Gravel hydraulic mine, Yreka, Cal.

W. M. NESBIT becomes Gen. Supt. Grand Central mine, Tintic, Utah.

L. GILSON, owner of mines at Casa Grande, has returned to Nogales, Ariz.

H. SIMONS, Supt. Morning Star mine, Iowa Hill, Cal., is in San Francisco.

J. HILBERT succeeds F. A. Farnum as Supt. Webb M. Co., Brown's valley, Cal.

I. L. MOOR, Gen. Mgr. Lucky Marion mine, Greenwood, Cal., is in San Francisco.

J. MCNAB, interested in Sonora mines, has returned to San Francisco from Arizona.

C. GRACEY, Supt. Southwestern M. Co., El Dorado Canyon, Nev., is at Volcano, Cal.

W. N. NESBIT has been appointed Supt. of the Grand Central mine at Eureka, Utah.

ELMER C. TOWNE, Supt. Commonwealth mine, Rocky Bar, Idaho, is in San Francisco.

CAPT. TAYLOR, Gen. Mgr. Oriental Con. mines, Chemulpo, Corea, is in San Francisco.

D. FRICOT, managing owner of the Independence mine, Grass Valley, Cal, is in San Francisco.

GEO. H. EVANS, Gen. Mgr. Con. California gold mines of Butte Co., has returned from Siskiyou Co.

H. T. SCOTT of the Union Iron Works, San Francisco, left the City of Mexico for Guadalajara, enroute home, Feb. 23d.

M. LA FORGUE, Mgr. Boleo copper mines in Lower California, becomes Mgr. of the Inguaran copper mines in Michoacan.

M. B. KERR of Valley Springs, Cal., will spend this month in a detailed examination of the Gaston Ridge mine, Nevada Co.

J. J. CASE, Ass't Supt. Boston & Montana Co., has resigned to become Supt. of one of the Bigelow Co.'s properties, Houghton, Mich.

RALPH NICHOLS, formerly Supt. Sutro tunnel, writes from Sydney that he is on his return from Coolgardie, Australia, to the United States via South Africa.

GEO. A. BETHUNE, professor of assaying at the Butte School of Mines, Montana, will treat by special process the refractory ores of the Mastodon mines, at Mammoth.

UNDER date of Jan. 6th, Jno. D. McGillivray, late of the MINING AND SCIENTIFIC PRESS, writes from Dawson City, N. W. T. Of the 1200 who left here last summer but 39 got through, of which number he was one. He confirms the conservative views taken by this journal, and offers little encouragement to any one to take the perilous trip.

J. SLOAT FASSETT, ex-Collector of the Port of New York, is in San Francisco superintending the shipment, per City of Peking, of a half million dollars worth of mining machinery for the Chemulpo, Corea, mines which he acquired two years ago as a special concession from the Corean Government. Ten practical millwrights will leave on the steamer Doric on the 12th inst. for Corea to put up the machinery.

Coast Industrial Notes.

—All this present war talk emphasizes the immediate need of the Nicaragua canal.

—The total shipment of oranges from Riverside for the season up to Feb. 26th was 610,779 boxes. This is a greater shipment than was sent out up to the same date last season.

—Property including 1,000,000,000 feet sugar pine on the Klamath river and a sawmill at Klamath, Or., is being bought by F. Carney of Marinette, Wis., J. H. Wilbeck of Chicago, and Messrs. Ducey of Detroit for $1,000,000. San Francisco lawyers are now getting titles in shape for the transaction.

—The Santa Cruz powder works are busy day and night. Four new presses have been received for the manufacture of smokeless powder, an additional output of 4000 pounds of smokeless powder daily. The capacity of the works is now two and a half tons of Government powder daily, and nine tons of black powder.

—A large work now going on is the tunnel of the Great Northern railroad in the Cascade mountains, western Washington. The formation at the east portal is solid rock; on the western end there is much earth interlaid with large boulders. Much progress has already been made at both ends, but, as the total length is to be considerably in excess of 13,000 feet, it is estimated that two years will be required for its completion. The east portal of the tunnel is at an elevation of 3400 feet above sea level, and, as it drops nearly 300 feet in the length, makes a grade of 1.7 per hundred, sloping toward the west; such a grade will furnish drainage and will also provide a draft for smoke.

—The Canadian Pacific and other northern lines announce a big cut in rates, which affects business in two directions. The present rates from the Atlantic seaboard to the North Pacific coast are $79 35 first-class and $67.40 second-class. The Canadian Pacific has made these rates from all points in New England and New York $40 first-class and $30 second-class. Rates to St. Paul are cut from $29.50 first-class and $28.50 second-class to $20 first-class and $19 second-class. The Southern Pacific road has notified all its connections that it will not accept business on the basis of rates made by the North Pacific coast lines. It has all the Alaska business it can handle from its own territory, for which it gets full rates and does not care to endanger this in any way.

—The Los Angeles Iron & Steel Works at Los Angeles, Cal., have been sold to R. H. Herron & Co. The works cost $120,000, and the bonded indebtedness of $30,000 represented the working capital of the concern. The plant is estimated to be worth $75,000 if the works were to be put in operation. R. H. Herron says: "Los Angeles occupies a similar position with her oil for fuel, and it is as cheap as the coal fuel used in Pittsburg. Billets can be landed in Los Angeles in shipload lots from Germany just as cheaply as they can be landed in Pittsburg. Apart, however, from working up the product from billets, the mill offers a market for scrap iron and steel, and heretofore there has been absolutely no demand for such material. In the light of all the facts there is no reason why the mill should not be started up and a very profitable industry carried on that is capable of indefinite expansion." Mr. Herron is negotiating with capitalists with a view to putting the mill in operation.

—G. Toppe, director Imperial Steel Works at Yawatamura, Japan, has been in the United States for two months, inspecting steel plants. He says: "The object of my visit to this country is to study the construction of the largest steel plants, the machinery used, the methods employed and, in general, everything pertaining to the iron and steel industry. Japan is building a large steel plant, and they want to embody the largest and most improved ideas in construction, machinery and methods of work. The Imperial Steel Works, which I represent, are being built by the Japanese government, and is the first steel or iron plant ever constructed in that country. Japan has hitherto been buying all her steel and iron from foreign countries. This steel plant will be situated at Yawatamura, a town of about 10,000 inhabitants, on the extreme northern end of the island of Kushiu. The island is very rich in coal. This industry is almost new, but over 3,000,000 tons of coal are now being taken out yearly. The ore beds from which we will get our supply of iron ore are on the island of Honshiu, which is a mile north of Kushiu. Honshiu is the main island of Japan, and contains Tokio, the capital. The ore will be brought from one island to the other on a ferry boat, thus saving reloading. The works will cost $10,000,000 and will be in operation in about three years. I do not know how many men will be employed, but there will be about thirty skilled mechanics from other countries to serve as heads of various departments. In the beginning the yearly capacity of this plant will be 100,000 tons; but this will be greatly increased later on. The products of this plant will be steel rails for railroads, steel plates for ships, boiler plate, bar and structural iron."

Recent California Mining Incorporations.

Sunrise M. Co. of Alaska; capital stock, $1,000,000, all subscribed; E. D. Bannister, F. Smith, W. A. Farish, C. C. Clark, W. H. Bailey.

Golden Jubilee M. Co.; capital stock, $500,000; subscribed, $352,600; A. L. Emery, C. H. Buck, F. E. Shrober, W. W. McNair.

Tanana M. Co.; capital stock, $5000; subscribed $4250; F. Soule, F. W. Beardslee, G. W. Bunnell, A. T. Heydon, E. H. Stearns.

Seven Sisters G. M. Co., Kennet, Cal.; capital stock $500,000, subscribed $300,000; G. W. King, G. Ferguson, W. V. Hayes, J. R. Lemon, A. R. Hayes.

North Star G. M. Co.; capital stock $100,000, subscribed $19,000; J. Curtis, F. Schilling, F. H. Finke, T. Trask.

Reliance M. Co.; capital stock $10,000,000, subscribed $50,000; J. H. Griswold, S. G. S. Dunbar, E. C. Fennessy, H. E. Snook, H. A. Tubbs.

Sunrise G. M. Co., to operate in Alaska; capital stock, $100,000; subscribed, $18,100; U. G. Heller, W. B. Goodenough, B. Stevens, W. D. Van Sicklen.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING FEBRUARY 22, 1898.

599,600.—GUN TURRETS—G. W. Dickie, S. F.
599,499.—FURNACE—H. S. Carr, Los Angeles, Cal.
599,628.—SHEET METAL PIPE—R. J. Northam, Los Angeles, Cal.
599,574.—BOOK REST—Betsey Sherman, Toledo, Wash.
599,647.—FRUIT DRIER—G. A. & B. G. Steevens, Salem, Or.
599,374.—BAND WHEELS—A. J. West, Aberdeen, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Commercial Paragraphs.

THE Ibex Mining Co. has ordered the third Jeanesville mining pump.

J. A. STRAITH & Co. of Los Angeles have established a well-equipped assay office at Nogales, Arizona.

GEO. W. KNEASS has a contract for building a 75-foot steamer for the U. S. Coast and Geodetic Survey, to be used in surveying in the Yukon. She will have two compound engines and twin screws, and will cost $12,000.

THE San Francisco Launch Co. is building a stern-wheel steamboat 180 feet long, to the order of the U. S. Government, for patrol duty on the Yukon. W. H. Birch & Co. have the contract for the engines, which must be completed in ninety days and will cost $40,000.

Mining Summary.

CALIFORNIA.

Alpine.

At the Advance and Colorado, north of Monitor, P. Curtz, Gen. Mgr. Monitor Mining Co., has fourteen men opening up the Advance mine, which has been abandoned for twenty-three years. Since November 1st last 1400 feet of the tunnels and drifts have been opened and retimbered. It is the intention of the company to pump out the shaft and prepare the lower workings for an examination of the ore bodies found years ago to ascertain their value before proceeding to any expenditures in the line of reduction works. The upper workings look favorable.

Amador.

The Gillick Bros., at Volcano, are sinking on the Studhorse. Below 50 feet they have struck hard rock. The prospect is good.

Mason and Griesbach have struck their pay chute in the new tunnel. They have good prospects.

The Ironbound is driving the tunnel with three 8-hour shifts.

The Robinson mine has been bonded and will soon be in operation.

Butte.

The Golden Feather Co. has concluded that the upper part of the river bed has been so thoroughly mined by the old workers that they are not justified in recommending any further outlay in reopening that portion of the claim. Another property has been offered them which is thought will yield a substantial profit. It consists of a large area of ancient river channel near Magalia. If the offer is accepted a new company will be formed under the title of the Magalia Consolidated Gold Mines, Limited. The price stated is $25,000.

A deed was filed last week conveying to G. H. Evans forty acres of mining land adjacent to Oroville. Mr. Evans also has bonded 200 acres, with privilege of prospecting the same.

The Oroville *Mercury* says that a project is under way to prospect the mountains near Forbestown by a tunnel. The Gold Bank tunnel, run into the mountain 1800 feet before intersecting the lode, has demonstrated that a saving has been accomplished by H. B. Stow, as it will do away with the expenses of hoisting and pumping machinery and drain the mine by gravitation. Ores that could not have been worked at all by the old method can now be handled at a profit.

Following the completion of the Gold Bank tunnel, the Syndicate G. M. & M. Co. is preparing for the construction of 5000 feet of tunnel and shaft.

From what is known of Forbestown hill and the number of veins that penetrate it, it is not unreasonable to suppose the Syndicate tunnel will cut many of these lodes. A conservative estimate places the number at not less than thirty.

The Butte Star mine is running and has a number of men employed. The Perry mine has started up at full blast.

Calaveras.

(Special Correspondence).—The Spanish Bar G. M. Co. have begun work, preparatory to extensive hydraulic operations, four miles from Mokelumne Hill. The officers of the corporation are: John Hay, Pres.; H. J. Grauerholz, Treas., and Jos. Kline, Sec., all of San Francisco, and W. T. Robinson of this place Supt. The company is building a large storage reservoir. Water will be furnished by the Foorman ditch. A hydraulic elevator is being placed. The property comprises thirty acres and is of a promising nature. The office of the company is at 224 Front St., San Francisco.

Mokelumne Hill, March 1st, '98.

An 18-foot ledge has been encountered in the crosscut running east on the 600-foot level of the Thorpe mine at Fourth Crossing. Berkeley people are the principal owners of the property.

The South Paloma mine at Valley Springs is temporarily closed down pending the result of present developments in the south shaft of the Gwin mine.

Citizen: The Machu mine at West Point has been bonded to a Salt Lake company. It will be started at once.

El Dorado.

(Special Correspondence).—The 5-stamp mill on the Larkin is steadily running on a fair grade of ore.

Development on the Selby by the Larkin Bros. is proceeding with good results in the output of ore.

John Melton has secured all the ground between the Gentle Annie mine and the American river, comprising several hundred acres. He will drive a tunnel from the river south to the old Poverty Point section and open up considerable new ground.

The twenty stamps at the Grand Victory are running continuously, and I am informed that the ore is improving.

The Salisbury is idle at present. The large ore bodies in this property, comprising nearly 300 acres, are of low-grade, averaging from $4 to $5 per ton with a fair percentage of sulphurets. The property, to be worked profitably, requires a large milling and cyanide plant.

The Mierson Consolidated and the Lloyd properties, adjoining town, are idle temporarily, awaiting capital to continue development.

I am reliably informed that Salt Lake people will begin work previous to the 1st of May on the old Pacific group, located almost in the heart of town, stretching to the American river in one direction and two miles to the south in an opposite direction.

There is much activity about Grizzly Flats, twenty-six miles east of here. Two shafts are going down on the old Mt. Pleasant, and work is pushed.

The old Church Union, southwest of town, is taking out $40 ore and keeping twenty stamps in constant motion.

Placerville, Feb. 26th, '98.

The Placerville *Democrat*, published a few miles from the historic spot where Marshall discovered gold, signalized the 50th anniversary of that event by issuing a superb jubilee edition on fine paper, profusely illustrated and of present and historic value. Mr. Carpenter is to be congratulated on the successful completion of a journalistic effort that would be a credit to a community many times the size of Placerville.

Brye & Lozano in the Bellevue are taking out good quartz. Over a month ago they struck a lead which has increased in value as they go in.

At the old Melton claim on Weaver creek, Potts & Co. are taking out paying gravel.

I. L. Moore, Gen. Mgr. of the Lucky Marion at Greenwood says that the company will resume active operations early this spring.

The Lone Star gravel mine, near Smith's Flat, owned by Proctor, Mountain & Co., is meeting with success. There are twenty men at work, and the 10-stamp mill is in motion day and night. The gold runs $19.50 an ounce.

Nugget: In the north drift at the 250-foot level of the Griffith Con. mine a valuable body of ore has been encountered.

Nugget: Kelley & Ball have leased the 10-stamp mill on the Big Sandy, and are working the mine on shares with the owners, who are a Toledo company.

Kern.

The new mill of the Johannesburg Reduction Works was seriously damaged last week by the breaking of the main shaft of the engine. They had been making some repairs to the mill and had just finished them and started the mill at 5 o'clock in the morning, and were hammering out the yellow stuff contained in the Wedge ore, when about 10 o'clock the main shaft broke and one of the big fly wheels went whizzing through the side of the building. The engine is a total wreck and beyond repair. It was a 20 H. P. Foos engine; there was a flaw in the most vital part of it, and to this the accident was due. Mr. Griffith, one of the proprietors, had a narrow escape, as he had just been standing where the big wheel went through the side of the building, and had stepped away a moment before the accident occurred. Another engine will be procured immediately, and the work will be delayed but a short time.

Miner: When the plowing for the pipe line was being done at Randsburg, H. Watson discovered some ore. Upon further development a ledge 16 inches wide was shown, and there is a pay streak of about 8 inches that yields a good prospect.

The Rand people have increased their force, and their daily output of ore is near 100 tons, running from $30 to $150 in value. They employ 120 men.

At Randsburg a company is figuring on an electric plant to supply 500 lights, with power sufficient to develop twice that number.

Review: The Garlock cyanide works were leased at the beginning of the year by Bell & Heydlouff. The weather in early January was too cold for satisfactory work, yet the first clean-up at the middle of the month showed well. Since the weather became warmer the work has been progressing successfully. They are working from 200 to 240 tons per month. The percolation process is used with wooden tanks. The precipitates are recovered by the acid process. The tailings are job lots from various mills, one of the largest being the Pinmore product, milled at the McKlearnan mill in November and December, 1897. They are paying 85 per cent of the assay value of the tailings, and deducting $3 per ton for working them. The assay value runs from $4 to $18 per ton, averaging probably $6 per ton. The work since the beginning of the year has been on tailings where the slimes were, during the stamp-milling process, separated from the essential parts simply by letting the water carrying the slimes flow off. This has proved to be the most satisfactory way of working these tailings. The slimes carry very little gold and seriously interfere with the percolation process. There are large quantities of low grade tailings at the various mills not yet worked.

One of the most interesting mines near Garlock is the property of E. B. Beecher. The ore thus far has been confined to a series of chimneys or "blow-outs," six of which have been worked 12 to 15 feet deep. These chimneys are in a line with each other, showing that they are off-shoots from the same ledge. Some of them are 16 feet lengthwise and 2 to 3 feet wide. The ore is high grade. There have been several mill runs which yielded good results. Mr. Beecher has temporarily ceased working the chimneys and is running a tunnel 100 feet below the lowest shaft. He has gone 40 feet and is working two shafts. W. S. Brigham has located the extension of this mine and finds the same arrangement of chimneys carrying the same kind of ore. He plans to push his development work right ahead.

Hoffman & Fay have begun developing a newly discovered prospect near the Colorado camp in the Goler district, eight miles from Garlock.

Los Angeles.

The Los Angeles Reduction Co. has incorporated to build and operate reduction works and smelters; principal place of business, Los Angeles; capital stock, $30,000; amount subscribed, $16,000; directors—H. Wickizer, A. Granville, J. W. Ghiselin, J. B. Hawley, A. B. Thomas, of Los Angeles.

Mariposa.

Gazette: The Virginia is running, but on account of water runs by "fits and starts."

Mentzer & Dexter are taking out good ore at Dogtown.

Mono.

At the annual meeting of the Standard Con. M. Co. Monday the old management was re-elected, J. W. Pew Sec. and R. G. Brown Supt. The company has $55,780.13 on hand.

Nevada.

(Special Correspondence). — The Reward mine, located within ten minutes' walk of Nevada City, after long and persistent work is finally out of debt. The present company took up the property after years of abandonment. When they had discovered ore of a paying quality water became too strong for them, and they ran a drain tunnel to Deer creek, a distance of 2400 feet, after which work was resumed developing the mine. They have reached a depth of 700 feet. They have been operating a 2-stamp mill. Last month they cleaned up $6000. They have ore blocked out above the 600 that will run them six months. At the 700 a new chute is coming in. The ledge is from 7 to 12 inches wide and its lowest value is $27, though some of it runs as high as $200 per ton. The sulphurets go 4½ per cent and run from $180 to $200 per ton.

The company is now out of debt and, beginning with February, will be a regular dividend payer. The property is owned by Nevada City and San Francisco people. J. Gribble is Supt.

The Texas, another property abandoned in the long ago, is showing encouragingly. The shaft is going down rapidly. It is considerably below 200 feet.

The Bellefontaine, also a property taken up after years of abandonment, is producing good ore. The owners have arranged to move a mill onto the property.

This section on the Father Lode is continuing its good record.

Nevada City, Feb. 26th, '98.

(Special Correspondence).—The Brunswick at Grass Valley started ten stamps last Tuesday on a good grade of ore. The stamps have been hung up for some time pending the placing of new pumps and subsequent unwatering. The company hopes soon to run the full twenty stamps.

Grass Valley, March 2nd, '98.

At the Red Dog mine, near You Bet, hydraulicking is in progress.

The Mistletoe M. Co. elected the following officers: D. E. Morgan, T. H. Wilhelm, F. J. Thomas, E. B. Power, W. J. Rogers. D. E. Morgan is president, W. J. Rogers secretary. The Mistletoe mine is located at Rough and Ready.

Union: At the Milliken mine, near Nevada City, the hard bar of rock has been overcome. The shaft is 600 feet deep, from which a drift has been run 400 feet. The ground is a soft granite, and from the indications gravel will be encountered in a short time.

The water is off at the Delaware, Harmony and other gravel mines, Nevada City, in consequence of which the miners are laid off. There is a break in the ditch near Blue canyon, caused by a snowslide.

In a few days the Phœnix mine, at Nevada City, will be clear of water. The water is lowered to the 400 level. The shaft is 480 feet deep. As soon as the mine is dry sinking will be inaugurated and pushed.

Work was suspended at the Gold Hill until the arrival of the compressor, but now a force of twenty-four men are at work, the miners working eight hours and three shifts employed. The shaft, which is 750 feet, will be sunk an additional 500 feet, which Supt. Hopkins estimates will take four or five months if no hard ground is encountered. In the meantime no other development work will be done. There is a ledge in the shaft, but the quartz is broken up, and more depth is necessary to get a solid formation. The old workings in the mine have been explored, but the riches of early days have been pretty well exhausted.

The Gold Hill has a record of over four million dollars to its credit. Those best able to know assert that there is a continuous communication in quartz between the workings in the Massachusetts Hill and Gold Hill, leaving, apparently, no doubt of the identity of the vein. The Massachusetts Hill is yielding handsomely, and the Gold Hill, under the circumstances, has good prospects.

Union: Progress is made at the Texas mine, the main shaft having reached 190 feet. Drifts will be run and sinking continued right along.

At the Eagle Bird mine, Maybert, the ore is turning out satisfactorily and the men are making good wages on the tribute system.

Union: Drifting at La Suerte mine, near Nevada City, is going on from the 350-foot level, and another drift was started Tuesday.

Plumas.

Bulletin: On Kellogg ridge, four miles east of Merrimack, the Kellogg Con. M. Co. has a 14-foot ledge of decomposed quartz on which development work will be resumed in the spring. The company expects to put in a cyanide plant the coming season. The Buckeye mine has a good prospect in drift gravel. Shafts are sunk and nine miles of ditch cleaned out ready for use the coming spring.

Riverside.

The machinery of the Alice mine will be shipped to Mexico. After considerable experimenting it has been found that it is unsuited to the reduction of the refractory ore, which must be treated by the cyanide process.

The Blue Rock, near Winchester, is 60 feet on the ledge, which is 20 inches, and has eighty tons of ore on the dump.

San Diego.

Ramona *Sentinel*: At the North and South Hubbard a crosscut tunnel on the dividing line about 340 feet in length taps the lead 200 feet in depth, and is used for a working tunnel by both properties.

The Ready Relief and Redmond mines, with a 10-stamp mill, are in constant operation.

The Alpha has a crosscut tunnel 230 feet tapping the ledge which is 2 feet of low-grade ore.

The Kentuck S. is cutting the vein 300 feet in depth with a 900-foot crosscut tunnel. The shaft by which the mine was worked to water level yielded $57,000 at a depth of 120 feet some years ago, since which time it has practically been idle.

The Antelope is being worked by Delgrove & Walker. They have a chute of good ore at the bottom of a 43-foot shaft.

Ramona *Sentinel*: The North Star has a shaft 150 feet on the ledge, with a drift at the 100 and 150-foot levels. The ledge averages 14 inches; length of ore chute as far as opened, 40 feet.

The Ranchita mine has a shaft 240 feet, and a 5-stamp mill running night and day.

Sierra.

Dr. Ellis is having rock from the Mexican mine crushed at the Gold Bluff mill.

The Bald Mountain Extension is sinking in the Lava at the end of the north tunnel. They are down about 50 feet.

Sacramento.

Folsom *Telegraph*: English capitalists have secured a bond for 100 acres of gravel land from the Natoma Co. and work will be commenced as soon as the necessary machinery can be placed.

R. H. Gegax is sinking a shaft near the Placerville switch, which prospects well.

G. White is mining on the property of A. A. Borges, and has struck good prospects.

Prairie City, a few miles from Folsom, has taken on new activity in mining.

Shasta.

The Redding *Searchlight* this week is a mammoth 62-page edition, handsomely illustrated and replete with valuable mining news of northern California. Trinity, Siskiyou, Shasta, Modoc and Lassen counties are well represented in its enterprising columns. The edition is throughout a home product and is a credit to its enterprising publisher, M. Dittmar. The illustrations are good, the reading matter is reliable and the publication is of real value to the section it fully portrays.

Development on the Mammoth mines near Kennet shows sulphide ore that carries 5 per cent in copper and good values in both gold and silver. The ore body is estimated to be from 160 to 200 feet wide.

E. Markwick purchased four claims in the Muletown belt and will push development. The ore in these claims is said to contain a good per cent of copper.

The London T. Co. is at work on their property near Muletown and at a depth of 180 feet is finding ore carrying gold and copper.

The Clear Creek P. Co. is putting in a dam to divert the water of South Fork and run it to their smelter, on Clear creek, this side of Igo. New machinery is being added to the smelter, and Mr. Markwick says it will be ready for operation by May 1st.

Siskiyou.

The Colorado Co. is opening the Hegler Bros. quartz mine on Humbug, and find good prospects.

The old Gold Ball mine at Salmon river from a crushing of ninety tons of quartz paid $18 to the ton.

The Aromas Hydraulic Co. at Salmon river has thirty men building a ditch, and expects to commence operations soon with a good supply of water.

The Salmon River Hydraulic Co., at Sawyer's Bar, has been hurrying ditching and fluming, and expects to start the giants in June.

The Greenhorn blue gravel mine commenced work last week. Shaft No. 3 is to be sunk to bedrock. A crosscut will be made from one side of the creek bed to the other.

The hydraulic mines near Oak Bar are turning out good lately, but there is only water enough to permit day work.

The Chinese company working a claim on Greenhorn creek has a good supply of water and is working steadily.

The King Solomon mine at Salmon river will be supplied with eight additional stamps.

W. Shell started his giant at New Pinery last week.

Reporter: Work at the Littlefield mine, near Callahans, is progressing.

At present there are only six men employed at the Black Bear mine.

W. Hobart is piping with a full crew of men. His ground prospects well.

This has probably been the dryest season ever known in the Salmon country. As a consequence, very few hydraulic claims are being operated.

The Horton Gulch and Summerville hydraulic mines, near South Fork of Salmon, are in operation day and night.

Tulare.

J. Roth bought the Mexican mine, White river, and will put men to work immediately.

McGorray & Co., on the Grey Eagle mine, are taking out rock which is said to pay $50 to the ton.

Tuolumne.

E. W. Chapman has secured the Calf Pasture and Heenan ledges in the Rock Creek district; W. C. Ralston the Buckhorn quartz mine in Ralston mining district.

On the Alameda the shaft is down 600 feet, with drifts run on the 100, 200, 400 and 500-foot levels.

Alameda county people have undertaken to develop the old Patterson gold mine near Tuttletown. The new company incorporated under the name of the Tri-Color Co.

The Eagle-Shawmut mine is an old property reopened a couple of years ago. Assays at different distances in the tunnel show up about the same, $28 being the average.

The Poor Man's Friend mine, located in Duckwall canyon, shows a vein which assays from $11 to $80 per ton. A tunnel 120 feet on the vein is the present point of working.

A. Briggs found a piece of quartz near Columbia last week containing $140 in gold.

The Golden Rule is running on good rock.

The electric plant of the Jumper mine is in full blast.

The Sonora *Democrat* says that another vein

has been struck in the Mountain Lily mine.

Good ore is being taken from the Harriman mine.

The Alameda contemplates erecting a mill.

The Eagle-Shawmut Co. intends to double the capacity of their mill. Twenty stamps are now in operation.

Democrat: A 40-stamp mill on the Patterson mine is one of the contemplated improvements in the vicinity of Tuttletown. It is said that chlorination works will be erected on the Gagnier mine.

Trinity.

About forty hydraulic miners employed by the La Grange Co. near Weaverville have struck against a cut in wages. The cessation of work entails a loss to all.

Yuba.

Lane & Co. are building a dredge on the Yuba river to operate on Howlett's bar, six miles from Browns Valley.

NEVADA.

The De Lamar *Lode* says that at the April Fool mine two large tanks are filled every day with $80 gold rock.

Men have been put to work at the cave of the De Lamar mine to quarry the ore that is exposed, enabling the company to extract hundreds of tons every day.

The McArdle M. Co. is shipping ore from their Salmon mines, near Wells. Two carloads of copper ore were shipped by the company last week.

The White Pine *News* says that the Golden Crown M. Co. has a large ledge carrying a percentage of manganese, silver and gold. They have six men at work. S. Davis is Supt.

The Glasgow & Western Expl. Co., on the Star and Grey Eagle group, is producing ore already concentrated by Nature, which they are shipping. In addition they are shipping concentrates from the mill which is in constant operation.

At the Chainman all work except that of pumping has been suspended at the mine and mill. The water is being lowered in the old workings and when under control sinking will be resumed.

In the Savage M. Co.'s ground on the Comstock lode, on the 130 level, the main west drift has been cleaned out and repaired a distance of 12 feet; total length, 390 feet. Brunswick lode—East crosscut No. 3 was advanced 5 feet; face in porphyry, with streaks of quartz giving low assays; total length, 65 feet. Work was resumed in main north drift, 600 level, on March 1. Incline shaft No. 1 has been sunk a distance of 14 feet; total depth, 1092 feet; bottom in porphyry.

In the Crown Point mine have been extracted about 300 tons of gold ore during the past week, and shipped to the Nevada mill fifty tons prior to March 1, on which date they intended to ship 250 tons to the Mexican mill for treatment, and thus compare the two methods of concentration. Pending the working of this ore they have suspended operations in the Crown Point mine.

In the Belcher, on the 1200 level, the north drift from the east crosscut from the main north drift from the incline is now in 95 feet, having been cleaned out and repaired 15 feet during the past week. The east crosscut from the north drift on the same level is out 11 feet, 6 feet having been added during the week; the face shows a mixture of quartz and porphyry. There have been hoisted during the week forty-one carloads of ore, the average car sample assaying $19.83 per ton.

The yield of the Overman for the past week amounted to six carloads of ore, of the average car sample assay of $24.79 per ton. This ore was extracted from the workings in the north drift on the 900 level.

At the Justice mine the west crosscut No. 2, started from the face of the south lateral drift, was turned to a southeasterly course and advanced 24 feet during the week, making its total length 133 feet; the face is in 18 inches of ore giving average assays of $33 16 gold and $74.28 silver, or a total of $107.44 per ton. During the week they shipped thirty-five tons of ore to the Douglas mill. Ore milled for the week, fifty tons; battery samples average, gold, $7.70; silver, $14.89; total, $22.59 per ton.

OREGON.

The width of the ledge in the Peacock, at Seven Devils, says the Baker City *Democrat*, is 102 feet and will average 22 per cent copper. An assay of the ore returns: copper, 35 per cent; gold, $10 60; silver, 18 ounces.

The *Observer* reports the finding of an extensive deposit of tin ore on the Illinois river in Josephine county.

The Jupiter G. M. Co. of New York has established at Kerby a complete assay office for the purpose of testing the value of the porphyry dikes on the Upper Althouse and Canyon creeks in Josephine county. They have bonded the placer and quartz mines of F. Houston in the Althouse district, and expect to develop these properties.

Hostler & Morris have located eight placer claims on Murphy creek, Josephine county, and will sink a series of shafts to bedrock.

Dr. Moore has bought a one-half interest in the Edison quartz ledge, eight miles south of Grants Pass, and has commenced developing the property.

Bennett Bros. of Terre Haute, Ind., have bonded a group of claims at Cornucopia for $75,000.

J. W. Robinson is running the Brass Nail placer, near Grants Pass, and cleaning up $50 per day.

J. C. Cope is equipping a hydraulic mine at Galice creek, and will start work in a few days.

The Lightner mill, Grants Pass, is crushing one and a half tons per day.

Observer: The Alexander and Bent placers, at Galice creek, are working full blast day and night. The ground pays from surface to bedrock, a distance of 120 feet.

H. C. McIntosh, near Grants Pass, is running two giants, with plenty of water and good prospects.

Messenger & Co. have started piping in Cayote.

Mr. Massie is doing development work in quartz on Cayote having 5 feet of ledge matter and prospected throughout.

The Sarah Belle Co., Grants Pass, after two years' development work, found a 4-foot ledge in slate and are extracting good ore.

WASHINGTON.

The Wells Fargo mine, at Springdale, has a tunnel 125 feet, and the ledge matter over 10 feet wide with well-defined walls.

BRITISH COLUMBIA.

(Special Correspondence).—The Channe M. Co. have pooled most of their stock and have reduced their capitalization from $1,000,000 to $250,000.

At Harrison Lake the Fire Money Co. is crushing free milling ore.

At Fairview the Smuggler Co. has decided to erect a 20-stamp mill.

The Tinhorn Co. claim that, through a mistake of their Supt., they have gone in several hundred feet on broken vein matter too poor to run through their mill, and that it will take time to remedy the mistake. On the other hand, the Winchester Co., operated by the same people, is down 90 feet in ore, and a 175-ton mill test, it is reported, went $40 a ton, chiefly in the concentrates, the plates holding something over $5 a ton.

Vancouver, March 1st, '98.

The Brooklyn in Greenwood has been bonded to W. McKenzie for $75,000, on which a cash payment of 10 per cent has been made. The property is a copper-gold proposition. Bulk tests show the ore to run $8 to $12 per ton in gold and 3 to 8 per cent copper.

The ore shipments of 1898 via the port of Nelson up to the 18th ult. come to 15,507 tons, valued at $1,845,225.

The force on the Good Friday at Rossland has been increased to thirty men. E. Voight is Supt

The War Eagle ore chute, which produced $87,000 in dividends under the Clark management, has been found in the 375-foot level, and is being developed.

THE KLONDIKE.

Collector of Customs Huestis at Port Townsend has received from the Treasury Department official notice of the opening of the Chilcoot Railway and Transportation Co. of Alaska as carriers of bonded freight and merchandise between the sub-port of Dyea and the British line.

The chief engineer of the Chilcoot Railroad & Transport Co. from Dyea says that the severe storms of February have interfered somewhat with the operation of the company's aerial tramway and caused delay to several thousand Klondikers in their effort to get over the pass. Sheep Camp has been turned into a city of tents and cabins, the latter belonging to men who have decided to engage in business. He says that 1500 men are blockaded there, and estimates that 3500 more people are strung out between Sheep Camp and Dyea.

Snow slides have buried a quantity of outfits near the Scales many feet deep. The owners must now wait until May before they can hope to recover their supplies. The piles of outfits to be seen around Sheep Camp are described as enormous. A number of wholesale stores could be started with supplies that have been hauled upon the ice at the cheap rates now prevailing. Freighters are hauling goods fourteen miles on sleds to Sheep Camp for 2 and 3 cents per pound, and for as much more they can be taken up to the Scales, four miles higher up, whence they are lifted over the summit.

Material for the Chilcoot Co.'s second cable was being pushed forward to Canyon City when he left, and it will soon be in operation between Canyon City and Sheep Camp. The vital part of the tramway system is a cable over the summit from Sheep Camp to Crater lake. This was started two weeks ago, but its operation has been delayed by storms. The company has, nevertheless, succeeded in moving all freight for the Canadian Government which it contracted to take over three weeks ago at 15 cents per pound.

During a recent blizzard on the summit of the pass 6 and 8 feet of snow fell in a single day. In places now the snow is 30 to 40 feet deep, and greatest care has to be exercised not to get off the beaten trail, for otherwise life is endangered.

He says that whatever gold there is in Stewart river, he is willing to part with his interest without any consideration whatever. Another who claimed to have ascended the Stewart 260 miles states that at that distance vegetation ceases and there is nothing but a vast field of snow and ice on every hand.

W. J. Beall, who has returned from Stewart river, sixty-eight miles above Dawson, says there is an encampment there of 400 people. He says the Stewart is practically an unknown river, only five men having succeeded in getting up any distance. The Stewart is said to be a treacherous stream.

The steamer Islander, which arrived at Victoria on the 2d, brings news that soldiers have taken charge of affairs at Skaguay. Scores of persons are dying at Skaguay and Dyea. The disease prevalent at Skaguay is spinal meningitis. A healthy man will feel slight chills ascend the spinal column, in a few hours the back of the neck becomes stiff and cold, the head is forced back, the brain becomes cloudy and soon reason goes. Black spots appear all over the body, and in a few hours death supervenes.

Two of the Queen's passengers died soon after their arrival in Skaguay—one of spinal meningitis, the other of heart disease.

Passengers on the Islander confirm the report that the Canadian flag has been raised at Summit lake, and state that it was done by order of Major Perry of the mounted police.

The report comes from Dyea that the Canadian Government will shortly establish a post at Crater lake, and, with twenty mounted police, enforce the collection of customs duties.

IDAHO.

The Ontario, Mammoth and other mines on Florida will be worked this season. The former milled a small lot of ore a few years ago which gave returns of about $300 per ton in gold.

The Florida Mountain Co. is sinking on its Humboldt mine, and expects to be in full operation this summer. This alone will mean a largely enhanced output. The property is equipped with a 20-stamp mill.

The Potosi mine is being operated under lease.

The Trader's Con. G. M. Co. is doing extensive development work.

At DeLamar the DeLamar M. Co. is installing a cyanide plant, a portion of which is in operation. This not only means a long lease of life for the company mines, but opens the way for the Garfield, Lepley and other low-grade properties in that district.

Silver City *Avalanche*: The mines of Owyhee produced from 1865 to 1875 about $30,000,000, and it now looks as though the output of that period will be duplicated and surpassed in the 1895-1905 decade.

In 1895 the output of Owyhee county, as given by the United States Assay Office at Boise, was $2,405,675; in 1896 it was $2,527,663, a gain of $121,988 For 1897 we have been unable to obtain exact figures, but it is known that the production was greater than that of the previous year. The Trade Dollar mines alone paid a half a million in dividends during 1897.

The recent developments in the Cumberland mine on War Eagle put it in the list of steady producers for 1898.

At the Poorman, whose first 100 tons of ore in 1865 gave mill returns of $90,000, it is known that good bodies of pay ore have been opened in the lowest levels.

The owners of the Tip Top group, idle for a number of years, have decided to push a tunnel into the property as soon as spring opens.

About the only drawback to a steady and rapid increase in mining in this section is the fact that we have no sampling mill, where prospectors and leasers can sell their small lots of ore. With a small sampler and custom (combination) mill, there would be increased activity in leasing and prospecting.

The statement prepared by the U. S. Assay Office at Boise shows that the production of gold in Idaho during 1897 was $6,626,564; silver, $7,103,321. Total, $13,729,885. This is an increase over 1896 of $1,978,040.

The Red Horse placer claim, near Elk City, has been sold to G. P. Mims for $10,000. Mr. Mims will equip the property with two giants with 10-inch piping and will build a mile ditch. Work will begin at once.

The Sellers Bros., near Salmon, cut a good sized ledge of copper and gold.

Ford & Brown have cut a 4-foot ledge of copper in the Brown Bear in Lemhi Co.

UTAH.

The Liberal of Bingham marketed its first lot of concentrates last week, showing 28 per cent lead, 7 ounces in silver and $1 in gold. The concentrates are derived from a very low grade material, which has been improving as it has been followed up.

The *Tribune* is informed that the Copper King, near Logan, has uncovered a vein of ore from 30 to 40 feet in width, abounding in native and peacock copper and oxide of copper. It also carries both gold and silver in appreciable amounts. The Copper King is being steadily developed.

In the new strike on the Martha Washington at Tintic, on the 250-foot level forty tons have been extracted showing an assay value of over 200 ounces silver and $4 in gold.

In the United States Supreme Court an opinion was handed down in the case of E. F. Holden vs. the Sheriff of Salt Lake county, involving the constitutionality of the territorial law fixing a day's work in smelters and mines in the Territory at eight hours. Holden was arrested for violating the law and sentenced to imprisonment. He brought the case to the Supreme Court in an effort to secure a writ of error on the ground that the law was unconstitutional in that it was calculated to deprive a citizen of life or property without due process of law. The court held that such was not the case, but that the law was an exercise of the State's police powers. Justice Brown said, in passing upon the case, that it was not the intention of the court to pass generally upon the constitutionality of the eight-hour laws, but that, in so far as State laws were exerted for the protection of the lives, the health or the morals of a community, there could be no doubt of the exceptional and unhealthful character of work in smelters or mines, because of bad air, high temperature and noxious gases, and hence the wisdom of the State Legislature. The decision of the Supreme Court of Utah was affirmed.

Eastern parties have, through R. O'Neill, secured a bond for $30,000 on the Cascade mine at Marysvale. The bond runs for two years in semi-annual payments.

The *Mercury* says D. Eyer has secured the Gold King group at Manning, and will develop the property thoroughly. A force is already engaged running a tunnel which will tap the vein at depth.

The mines of Bingham one day last week shipped twenty cars of ore. The consignment was the heaviest that has been sent out of the camp in nearly three years. Among the more prominent in the big output were the Spanish, the Old Jordan, Giant Chief and Phœnix. The ores generally show a high percentage in lead, with a fair amount of silver and small values in gold.

Tribune: The Geyser-Marion M. C. will proceed at once with the enlargement of the Geyser mill, which will have its capacity increased to 150 tons a day.

The filling of the bins at the Golden Gate mill has begun, and the crushers put through a rehearsal.

Although no attempt was made by Secretary Almy to estimate the value of the Daly tailings as an asset, it is well known that the management regards them as a source of considerable revenue, and capable of providing for half a dozen dividends of $25,000 each. Recent experiments at the Marsac mill, through which 500 tons were passed, convinced Supt. Chambers that the tailings could be made to yield a fair profit, and as there are 200,000 tons on the dump arrangements to work them will be undertaken. It has been said that the tailings will net $2.50 per ton.

The Old Jordan mill has run steadily during February and delivered 1600 tons of concentrates.

Another strike is reported in the Antelope group at Bingham, in which the ore shows thirty-five ounces silver and $8.10 in gold per ton.

The Bingham *Bulletin* says that the developments of the Starlus mine consist of 1200 feet of openings, including a main tunnel driven 790 feet, crosscuts from it to determine width of vein, an incline tunnel sunk 160 feet, and 200 feet of drifting at 200 level. Everywhere there is mineral in sight, varying from 10 inches to 3 feet. An average of all assays gives about five ounces silver, $2 in gold and 8 to 9 per cent copper per ton.

The *Tribune* states that the starting up of the Daly-West mill and the marketing of ore will take place in a short time. The mill, with a capacity for handling 100 tons a day, is in readiness, while blocked out is enough ore with which to supply it for an indefinite period.

Tintic *Miner*: It is reported that a strike of lead carbonates in the shaft of the Lower Mammoth has widened into 3 feet of ore that shows a value of 25 per cent lead, fifty ounces silver and about $4 in gold.

The Silver City G. & S. M. Co. has filed an action against M. K. Lowry and others, says the Salt Lake *Tribune*, to quiet title to what is regarded a valuable area in conflict between the Wheeler and Little Clarissa mining claims in Tintic district.

The settlements in the ore and bullion market on Tuesday sustain the reports that the tonnage for the month just closed is in excess of the corresponding period last year, and that everything indicates a steady increase as the roads between the mines and railway tracks improve.

The Crystal at Marysvale contemplates many changes for the new mill.

The Galena Co. is engaged in making the heaviest shipment that has been undertaken by that company in over a year. The lot consists of forty tons, the assays showing 32 per cent lead and 88 ounces in silver.

Tribune: Efforts to harmonize contending interests in the Daly-West having failed, the stockholders in that portion of it which is incorporated adopted a resolution calling on Daly to start the mill and begin marketing ores as soon as, in his judgment, it is expedient. The mill is ready to start at a few hours' notice, while the marketing of crude ore, which averages about 25 per cent lead, from 50 to 65 ounces silver, $1.50 in gold and $2.50 in copper, could begin at any hour.

MONTANA.

The Golden Sceptre M. Co. of Quigley has reorganized, and the mine and mill will both be put in operation. The old company spent $650,000 on the property and passed into receiver's hands with debts aggregating a quarter of a million dollars. New stock has been issued to the creditors and $400,000 new capital put into the property. Manager McDonald says they have in sight enough low grade milling ore to turn the mill for fifty years. "The ore runs $4 to the ton, but we can handle it for $1 a ton when the plant is fairly in operation. There remains four miles of a tramway to be completed."

It is stated that the Snowshoe mine at Libby is soon to become the property of an English company. The price is believed to be in the neighborhood of $200,000.

After paying dividends to the amount of $2,175,000 the Hecla Con. at Glendale is reported to be in a bad way. Gen. Mgr. Knippenberg in his report for 1897 showed a loss of $39,438.50, and calls attention to the fact that the surplus has been drawn upon to run the property during the past twelve months. The decrease in the quantity of lead ore produced in the mine, which necessitated the closing of the smelter because of the insufficiency of lead ores to melt it, is mentioned as the principal reason of the failure of the property to produce at a profit the last year.

The Hecla Con. properties produce lead, copper and silver and a small quantity of gold. The number of pounds of lead bullion produced was greatest in 1888, when it reached 6,884,857 pounds, and it declined steadily after 1894. The production of silver varied from 716,859 ounces in 1888 to 215,431 ounces last year. The percentage of gold was comparatively small, 300 to 400 ounces being an average for a year. The Gen. Mgr's report gives the following statement of the production of the mine during the years beginning with 1881:

Year.	Pounds Lead Bullion.	Pounds Copper.	Ounces Silver.	Ounces Gold.
1881....	4,843,646	215,067	534,197	....
1882....	4,984,697	229,708	547,754	307
1883....	5,203,919	308,519	662,835	402
1884....	4,589,280	339,928	656,849	248
1885....	5,528,653	177,567	686,845	712
1886....	4 102,040	64,786	389,707	999
1887....	4,663,148	123,642	474,719	441
1888....	6,884,857	208,605	716,859	1,210
1889....	6,138,258	228,380	579,430	1,098
1890....	4,298,176	159,981	480,904	691
1891....	4,030,947	89,674	485,209	666
1892....	3,304,040	157,516	364,396	343
1893....	1,973,851	94,095	326,340	210
1894....	2,941,912	362,897	616,808	343
1895....	1,175,523	239,631	347,642	339
1896....	1,331,645	315,702	365,223	547
1897....	1,990,175	184,836	215,431	405

The cost of mining a ton last year was

$20.52. The number of tons handled was 44623/4. The total number of tons produced since 1876 was 197,3022/5, the cost of mining having been as low as $12.78 in 1878. The mine in 1897 had a pay-roll of $212,897, running from $13,000 to $29,000 for the various months. The mine was run at a profit of $12,138 in January and made $5013 in October; but all other months showed losses, running up to $13,684 in August, making losses aggregating $59,684, and a net loss of $39,438 for the year. In his report Mr. Knippenberg says: "At the time I wrote my last annual report I thought, from appearances, that 1897 would be a fairly profitable year. My hopes were not realized; my judgment was at fault. Month by month the lead ore became less in quantity and lower in value, until we were obliged to close down the smelter, because we had not sufficient lead ores to run. As a result, the year 1897 not only shows no profit, but an absolute loss. We have been compelled to use up the surplus we had on hand at the beginning of the year, viz: Surplus Jan. 1, 1897, $71,218 62; total receipts, 1897, $173,459.41—$244,678.03. Total expenses, 1897, $212.897.91; dividends Nos. 144 and 145, $30,000—$242,897.91; surplus Dec. 31, 1897, $1,780.12. Placing the year squarely upon its own merits, we show a loss of $39,438.50. During 1897 we ran one furnace 263 days of twenty-four hours each, consuming 4614 tons of ore and concentrates, 224 tons of roasted flue dust and 293 tons of skimmings; in all, 5131 tons of material containing silver and lead. The average assay value of this material was 28 4-10 per cent lead, 27 1-10 per cent silica, 16 1-10 per cent zinc and 44 94-100 ounces of silver per ton."

The Magg A. Gibson and A. F. Grater dredges at Bannack struck good ground last fall and the output of gold from these dredges will be more than twice that of last year. A. F. Ball, representing an English company that is constructing the dredge three miles from town, will push work.

Edwards & Curin commenced work on the Excelsor, near Bannack. The mine is leased from the Western Enterprise Co. of Butte.

The Ruby mine has produced in the last six months nearly $200,000 worth of ore.

L. Z. Leiter, through his agent, E. H. Treise, purchased the Black Eagle, near Sheridan, for $5500.

Work started on the Jim Blaine claim in Republic.

The suit between the Boston & Montana Co. and the Montana Ore Purchasing Co. is being fought out under the law of apex and involves about $500,000.

A. M. Easterly is working the Hard Cash lode at Radersburg, and has opened up a good body of ore.

On the Hope mine at Basin the water is pumped to the 100-foot level.

The *Madisonian* says that less than 200 tons of ore were crushed at the Madison, on the Big Hole river, but enough to demonstrate the utter worthlessness of the mines. The new 20-stamp mill and other machinery has been moved to the Pipestone mine.

SOUTH DAKOTA.

At Deadwood the property of the Portland Con. M. Co. was sold on the 1st by the sheriff to satisfy a judgment of foreclosure. The property was bid in by H. W. Seaman of Clinton, Iowa, trustee of the stockholders, for $388,798.

MICHIGAN.

The directors of the Osceola Con. M. Co. report the operations of the company, including the operations of the Tamarack Jr. and Kearsarge mining companies, for the year ended Dec. 31, 1897: Gross receipts from sales of copper and other income, $1,338,056.11; total costs, $1,075,655.03; net income for year, $262,401.08.

During the year the following was spent for construction: Sinking No. 6 shaft, $34,746.63; engine and boiler house at No. 6 shaft, $29,593.04; rock house at No. 6 shaft, $10,116.01; sundry construction, $3704.39; total, $78,160.07.

The dividend statement from Nov. 15, 1878, to date shows total dividends paid amounting to $2,263,500. The superintendent's report says: "The levels north of No. 2 shaft in the Kearsarge have now sufficiently proven copper ground at such long distances from the shaft as to justify the sinking of a new shaft near the recently acquired Iroquois territory. I would recommend this work to commence as soon as possible. Largely increased compressor power has been contracted for during the year, and at this writing the machinery is nearly all on the ground and will soon be in place. In a general way it can be said that this end of the consolidated interest never looked more promising for good results than it does to-day. At the 31st level, south of No. 5 shaft in the Osceola, a crosscut for the purpose of testing the Calumet conglomerate has been drifted 243 feet. As the horizontal distance between the two lodes is about 700 feet, the probabilities are that about June 1 the conglomerate will be reached. This is a very important opening and may add materially to future prospects. Rock mined for the year, from all branches, 524,364 tons; rock stamped for the year, from all branches, 443,086 tons. The cost of stamping was 25.574 cents per ton. Mineral obtained for the year, from all branches, 13,957,373 lbs. At the stamp mill a tunnel is being drifted through the sandstone that will in future supply the entire pumping system with water. This will not only avoid the expensive maintenance and extension of bulkheads to keep an open section channel for the pumps, but will also give free scope for the deposition of sand along the entire frontage of the mill. The tunnel is 8x8 feet in section and will be wholly submerged when connected with the lake."

ONTARIO.

The Sandy Lake mine, near Dinorwic, is down 50 feet and the assays average $9 to the ton. The reef is said to have a witdh of 100 feet.

The Stella mine, near Portage, from a mill run of twenty tons gave a yield of $27.61 free milling gold per ton. The vein on the surface, traced for half a mile, is from 2 to 3 feet wide. The shaft is now down 65 feet. The company contemplates placing machinery.

COLORADO.

The Colorado Springs *Telegraph* says that the Kittie M. drifted on a new vein with such success that it is now shipping ten tons a day, the assays ranging from $20 to $244 per ton.

The monthly average of ore shipped from the Bachelor at Creede is 15,000 tons.

Production from the Anchoria-Leland at Cripple Creek holds at from 125 to 150 tons of smelting ore a week.

A tramway is in contemplation at Eldora to connect with all the principal mines of the district and deliver the ore for handling by the railroad when it reaches the camp.

The Antietam at Eldora is developed by a shaft 108 feet deep, at the bottom of which there is 4½ feet of shipping ore that will run from $60 to $70 to the ton. The mine is now being worked with a whim. A steam hoist will be installed in the spring.

The Revenge at Eldora made three shipments which ran $54, $112 and $96 per ton, respectively. The vein is 6 feet wide, with a pay streak averaging more than 1 foot in width of high-grade ore.

The Norway group at Eldora has opened an 8-foot body of ore that runs $35 to the ton.

The Mollie Maguire shaft, about 30 feet deep, has opened a 4-foot vein of sulphides, which gave assay values from $30 to $50.

Thirteen claims known as the Gold Cable group, San Miguel county, were sold to the Con. I. Co. of New York. About 1200 feet of development work has been done on the properties and several ore bodies have been uncovered. Mill runs returned $15 per ton and the concentrates will average $20 per ton.

The Lillie G. M. Co., Cripple Creek, has paid $45,000 in dividends and has a treasury reserve of $45,000, and in addition has between 500 and 600 tons of ore in transit.

A good strike is reported on the Kalamazoo, operated under bond for $75,000 by W. H. Reynolds of New York. The shaft is 500 feet deep.

The Modoc is producing large values. From the winze sunk from the 500-foot level the ore runs as high as 300 ounces, and a carload shipment returned 37 ounces gold and 29 ounces silver to the ton.

The Silver Wing proposition at Silverton, long idle, will be again in operation next month. The 1400-foot crosscut will be continued to cut the Denver lead.

The production for 1897 of the Strong was given at 18,000 tons, and its gross value $750,000. The Denver *Mining Record* says that it is now learned from a reliable source that the tonnage was greater and the value of the output was double the figures given. In the last six months of the old year the value of the ore shipped was over $1,000,000. Now the mine is sending to smelters and mills 175 tons each day. Of this, 100 tons runs in carload lots from $30 to $100 per ton. The ore comes from the north shoot, where the ore body is from 22 to 28 feet wide, in a shoot 250 feet in length. In the bottom level there are over 3000 tons of ore broken which cannot be raised, as the hoist is kept busy keeping the drifts at the 400-foot level free of ore and waste. If the present rate of production is maintained, the output for the year 1898 will not fall short of $3,000,000.

The Colorado Springs *Telegraph* says that the find in the Uinta tunnel at Victor is being followed up and steady production made. It is as fine a body of ore as has been exposed in Battle mountain in the last six months and is in a blind vein, or one that has not been opened up within 1500 feet of the tunnel. The strike is not in Portland ground, nor in a claim located prior to the date of the tunnel, and those who know say that under the recent tunnel decision of the United States Supreme Court the tunnel will have 1500 feet of the vein. It is reasonable to suppose that a fight for rights to the vein will be made by the owners of the surface ground, since the ore will not be gained without a fight, but it will make a clean-cut issue on the right of a tunnel to an undiscovered vein found in a claim that was located subsequent to it, but patented before the discovery was made by the tunnel. The conflict that will naturally arise is by far the most important one that has come since the tunnel question was settled by the courts.

The fight between the Uinta and the Portland, which is to come up in the courts in March, calls up again the question on which Judge Hallett recently rendered a decision in the suit of W. W. Stratton against the Gold Sovereign tunnel. That is, the right of way of a tunnel through ground located prior to the tunnel and patented before the bore reached its lines. The famous Rico-Aspen decision did not establish the right of a tunnel in such case. If Doyle is stopped from running the tunnel through the Lowell claim it will be impossible for the Uinta to be completed to the heart of the Portland group, or to reach the big veins that were opened after the tunnel was located, in which case he would be forced to stop work where the tunnel now is, under the injunction, and content himself with the big vein from which production is being made, granting, of course, that the courts allow him to retain it.

The Lonaconing on Beacon hill, after a temporary suspension, has been resumed. Returns from the last shipment gave a value of $62 a ton.

Recent development work on the Londonderry at Cripple Creek is of an encouraging nature. The shaft has attained a depth of 300 feet and bodies of low-grade ore have been cut in the shaft.

The Erickson on Gold hill is working on a 2-foot body of $75 ore in the 100-foot level and making occasional shipments.

Denver *Republican*: The strike made by crosscutting the west vein of the Geneva on Gold hill may make that property as heavy a producer as it was before the ore was lost by a former management. A shipment of seventy tons of the new rock was divided into two grades, one of six ounces and the other of ten ounces. The chute has been opened for 20 feet in length in the drift at 150 feet, and holds ore both ways.

A shipment of five tons from the old Bryant shaft on the Bogart returned $90 a ton.

The last car from the Birch netted $2083.46. It is estimated the lessees will clear $15,000 for January.

News Reporter: The Lost Canyon & Deep Tunnel M. Co., near Twin Lakes, has twenty-seven lode claims and 400 acres of placer ground. The lode claims have all been prospected and veins of gold-bearing rock uncovered on all of them. Assays have been made showing from one-half to six ounces gold to the ton. The company has a tunnel 300 feet, which as it extends will open all the lode veins. R. R. Foster is Gen. Mgr.

The Sedalia shaft at Leadville, which has reached the depth of 800 feet, will be sunk another level and drifts extended to catch the ore chutes coming from the upper levels. The mine has ore bodies in reserve in the levels above which have been drawn on very slightly, the policy of the management being to prosecute the work of development to the fullest extent and extract the ore at pleasure.

Reporter: The Pyrenees shaft has reached the depth of 1000 feet. An additional 80 feet of sinking and the shaft will be through the porphyry and into the lime formation, which will be 64 feet in thickness. When the lime is penetrated, the total depth of the shaft will be 1144 feet.

The Golden Eagle, at Telluride, shows a pay streak of 10 inches, running $75 in gold and seventeen ounces of silver.

The Congress mine, Red mountain, is shipping from fifteen to twenty tons per day.

NEW MEXICO.

The Old Abe mine, near White Oaks, is taking out ore sufficient to keep the stamps dropping as in the days before the shaft fell in. The company intends to put up a cyanide plant.

The South Homestake, at White Oaks, has been thoroughly prospected during the past two months with good results, and it is reported that this old-time producer went into the hands of Eastern parties on the 1st of March. The bin and many of the drifts are full of high-grade ore ready for the crusher.

J. M. De Kierscey is working four claims. On the Golden Dawn in Grant county he has a shaft 55 feet; the vein averages 6 inches and assays 1¾ ounces gold, 9 ounces silver and 8 per cent copper. A mill run gave returns of $14.65 per ton in gold on the plates.

The Confidence mine, owned by the Helen M. Co., is working seventy miners and producing 80 to 100 tons of ore per day, which is reduced at the company's 30-stamp mill at Whitewater. The new water-power plant is rapidly nearing completion. The pipe line to the mill is about 8000 feet in length. The company has in its own claims large bodies of a fair average grade in gold and silver.

J. P. McCarthy has bonded the Log Cabin mine, formerly known as the Alamo, for the Picher Lead Co. The mine is located about two miles from Central.

N. S. Berray has forty-five men employed on the Hanover mine, a producer of copper ore. The furnace is running steadily. There is an accumulation of nearly 1000 tons at the smelter.

The Othello and Desdemona mines in Grant county, belonging to the Kansas City Smelting and Refining Co. of El Paso, produced 10,800,000 pounds of lead and 81,500 ounces of silver in 1897.

Ashton & Roach purchased the Wild Cat mining claim, located on the western slope of Santa Rita mountain. There is a vein of copper ore on the property. Development work has been commenced.

The Santa Rita smelter, under the management of J. B. Gilchrist, is running steadily. A carload of black copper was shipped last week.

On the Booth mine six men are employed. At a depth of 48 feet they have a body of copper-iron ore 32 inches in width.

F. P. Jones is working the north end of the Romero mine, near Silver City, under lease. Twelve miners are employed and forty tons of copper ore per month is extracted, besides a lot of low-grade ore which can be concentrated. A large part of the ore produced and smelted last month ran 26 per cent copper.

The shaft of the Benton at Dolores is down 300 feet and the streak of from $75 to $100 ore at the bottom seems to be widening with every shot. They are also finding good ore in the drifts. They will ship three carloads of ore.

ARIZONA.

The Lehman group was sold last week for $35,000 to T. K. Lloyd and others of Salt Lake. The new owners will begin work immediately and will put up a 10-stamp mill. The mine is four miles northeast of Briggs and has a pay streak averaging $40 in gold to the ton.

L. R. Britton of Denver has bonded the Swallow group in the Castle Creek district. There are 800 feet of drifts and a shaft 200 feet in the mine. It is a copper camp, of the same character as the United Verde.

In the Dragoons, Cochise county, the Fitts Barrett Co. has a thirty-ton smelter in operation. The company has taken out a thousand tons of copper ore.

The Tennyson, fifty miles from Phœnix, is a free milling gold proposition, the development of which has encountered a 5-foot chute of ore returning $18 to the ton. The development consists of a shaft 78 feet deep and a tunnel 30 feet north of the shaft, tapping the ledge at 40 feet.

Work at the Golden States copper property, near Tombstone, is being pushed. The smelter, it is thought, will be ready to blow in March 10th. Twelve men are at work in the mine.

After a year's idleness the United Globe smelter was blown in last week. This marks a permanent revival of the copper industry of Globe. The large furnace in operation has a capacity of 150 tons.

The McCabe, in Yavapai county, has been well developed and has just begun to be a producer.

The ore body of the United Verde at Jerome has a width of 400 feet at the present depth of the mine, which is 500 feet. The ore carries considerable gold. Over $2,000,000 a month was the copper product of the mine last year. New smelters are to be added.

The Elkhart, in Chloride district, operated by the Security Mining and Development Co., owns sixteen claims. Two hundred feet has been reached and considerable drifting done. A stamp mill works over 100 tons daily. The Southwestern M. Co. has three shafts on the Schuylkill. Silver is high grade and lead is apparent.

A Denver company has bonded the Payroll and other openings owned by Judge Murphy. They will do extensive work at once on six claims.

The 20-stamp mill of the Senator M. Co., eighteen miles from Yuma, is crushing fifty tons of ore per day. The mine has reached a depth of 200 feet.

The Phœnix *Republican* says that the Fortuna is getting out $60,000 per month in gold. Five levels have been run, the deepest being 550 feet. A 20-stamp mill is operated. The Fortuna is fifteen miles south of Blaisdell.

The Ajo copper mine, in Pima county, is being developed and looking good.

The Jaynes mines in Yuma county are to be operated again. Twenty-five men are doing development work. The ore is to be treated by the cyanide process.

Forty miles south of Kingman a 15-stamp mill is operated by the Cedar Valley M. Co. on ore from the old Arnold mine.

MEXICO.

Mexico's gold production in 1897 was $6,800,000, as against $6,075,108 in 1896.

SOUTH AFRICA.

The following reports on South African mines are for January:

Wemmer: Crushed 6466 tons, yielding 4410 ounces; cyanide plant, 4375 tons treated, yielding 956 ounces, and from concentrates 157 tons caught, assaying 90 pennyweights per ton; total, 6072 ounces gold.

Van Ryn West: Number of stamps, 55; tons milled, 8710; number of ounces recovered, 3130; cyanide works, tons treated, 6720; number of ounces recovered 1333; total amount gold, 4463 ounces.

Robinson Randfontein: Stamps, 35; ore crushed, 5242; gold retorted, 2632 ounces; tailings (cyanide process), tons treated, 4410; gold recovered, 570 ounces; concentrates (cyanide process), tons treated, 48; gold recovered, 139 ounces; total gold recovered, 3341 ounces.

Langlaate Estate: Stamps running, 175; ore crushed, 22,195; gold retorted, 5754 ounces; tailings (cyanide process), tons treated, 14,850; gold recovered, 1472 ounces; concentrates (cyanide process), tons treated, 650; gold recovered, 1466 ounces; total gold recovered, 8692 ounces.

North Randfontein: Stamps running 40; ore crushed, 5856 tons; gold retorted, 1223 ounces; tailings (cyanide process), tons treated, 3840; gold recovered, 518 ounces; concentrates (cyanide process), tons treated, 105; gold recovered, 203 ounces; total gold recovered, 1944 ounces.

Porges Randfontein: Stamps running, 60; working days, 22; ore crushed, 6555 tons; gold retorted, 2807 ounces; tailings (cyanide process), tons treated, 4950; gold recovered, 714 ounces; concentrates (cyanide process), tons treated, 87; gold recovered 460 ounces; total gold recovered, 3981 ounces.

Ferreira: Crushed, 10,400 tons; bar gold extracted, 7914 ounces; concentrates caught, 240 tons; assay value of concentrates, 6 ounces fine gold per ton, equal to 1440 ounces; cyanide works, bullion produced from tailings, 2859 ounces; total gold from all sources, 12,213 ounces; profit from all sources, £27,775.

Rose Deep: Stamps working, 100; number of days, 29¾; tons crushed, 14,706; yield in smelted gold from mill, 5955 ounces; tons of sands and concentrates treated by cyanide works, 12,352; yield in smelted gold from cyanide works, 3711; total, 9666 ounces; estimated profit for month, £15,900.

Langlaate Star: Stamps running, 30; ore crushed, 5292 tons; gold retorted, 3097 ounces; tailings (cyanide process), tons treated, 4381; gold recovered, 934 ounces; total gold recovered, 4031 ounces.

Crown Deep: Stamps working, 180; number of days, 24 5-6; tons crushed, 22,082; smelted gold from mill, 6869 ounces; tons of sands and concentrates treated by cyanide works, 20,180; smelted gold from cyanide works, 6560 ounces; total, 13,429 ounces; estimated profit for month, £17,000.

During December,'97, the Jumpers mine produced gold to the value of £20,297. The profit for the month was £7194. One hundred stamps ran 29½ days, crushing 12,300 tons, which produced 3937 ounces of bullion. The gold produced from the tailings amounted to 993 ounces, and from the concentrates, 715 ounces. The working cost per ton, including mining, hauling, pumping, transport, milling and cyaniding, was £1 1s 4d. In January they crushed 11,500 tons; obtained from mill, 3902 ounces of gold; obtained from concentrates by cyanide, 505 ounces of gold; obtained from tailings from cyanide, 1000 ounces of gold; total, 5407 ounces of gold; profit for month, £6160.

AUSTRALIA.

At the Broken Hill Proprietary 24,571 tons of ore were crushed for the four weeks ending Feb. 3rd, and the output from the refinery was 3541 ounces of gold, 387,792 ounces of silver, 2238 tons of lead and 65 tons of antimonial lead, the copper matte containing 39 tons of copper and 34,584 ounces of silver.

Sampling Ore in Place.

At a recent meeting of the Colorado Scientific Society, in a discussion of "Sampling Ore in Place," J. A. Porter thought more errors are made in this work than in any other branch of the mining engineer's profession. Many cases in which great errors were committed have come to his personal knowledge. Too much care cannot be taken. As a rule, samples are neither sufficiently large nor sufficiently numerous, and instances are not wanting where the expenditure of half a million dollars depended on samples aggregating fifty or sixty pounds. When an ore body is to be sampled, all work in the mine should cease, and the examining engineer should have entire charge of the property. At least three independent samples should be taken, and they should involve tons, not pounds. Even in very homogeneous veins a sample should be taken every 10 feet of length and in gold mines nothing short of an actual mill run can be relied upon. He regards the sampling of an ore body as of more importance than the sampling operations on the results of which ore is sold, as the former usually involves the transfer of a much larger sum of money than the latter.

W. L. Austin cited a case in his experience in which the mine samples, though taken with the greatest care, gave persistently higher results than could be obtained at the mill. At the mine, samples were taken from the working faces in the stopes, and a hand sample was taken from every car of ore brought out of the mine. The results showed an average of about 100 ounces of silver. At the mill, the bullion returns, plus the tailings assays, showed only about forty odd ounces. Mr. Austin's explanation of the discrepancy is as follows: The valuable portions of the ore were chiefly chlorides, bromides and other extremely brittle minerals. The picking and gadding necessary in breaking down rock for the sample, jarred large quantities of these brittle materials out of the rock which was left in place, and these fell upon the cloth spread below, so that the engineer unconsciously "salted" his own sample. He thinks that the results of mine sampling with certain classes of ore, even when the work is carefully done, are almost invariably too high, and that small hand samples are, in many cases, comparatively worthless.

H. E. Wood believed hand samples, properly taken by a person who understood such work, to be perfectly reliable. He thought that the expense attached to the method of sampling suggested by Mr. Porter would be prohibitory in very many instances.

E. Le Neve Foster said this is the most difficult work we have to do. The general experience is that estimates based on samples far exceed the results obtained in the subsequent working of the mines. The engineer frequently deceives himself. In attempting to include a fair proportion of the more valuable ore, he often gets too much. In silver ores the most brittle portions are the richest, and, in sampling, we are very likely to get too large a proportion of this material in spite of the great care exercised. I think it is necessary to break at least 100 pounds of ore at each place where a sample is taken, and then quarter this down to a convenient amount. In estimating the value of a mine which has been worked to a considerable extent, the safest plan is to base the estimate on previous sales of ore. Even this method must be used with some caution, as it is very probable that the richer portions of the vein have been worked out, and the poorer ore left.

H. A. Vezin thought that there is no difficulty in making sufficiently accurate samples of ore in a mine if the examiner will only take the trouble to follow a simple system, consisting of purely mechanical methods, instead of using what he is pleased to call his judgment, which generally consists in picking out a sample by judging of its value by the eye. He agreed with Mr. Porter that the trouble lies in the sampling improperly done. When a slice is taken at any one point it should be deep enough to take as much of the hard as of the soft, and these slices should be taken at sufficiently short intervals and in sufficiently large number.

In one case he cited the sampling of a mine from which good results had been expected. His assays of ore that had been brought to the smelting works for treatment, gave such low assays that his ability as an assayer was seriously called into question, the value being scarcely one-half of the estimates previously made, all of which were based upon the results obtained from treating several hundred tons of ore. The mining captain, a very careful man, was ordered to take samples of the vein, and he brought ten of these as the result of about five or six hours' work. Mr. Vezin objected to the method employed, but was told by the manager, who did not consider that his opinion, he being merely the assayer, could be of much value, that what he required in sampling the vein would make each sample cost $60. He thinks that $6 would have been more than enough, but, assuming even that the other estimate was correct, the total expenditure would have been $600, and it would have resulted in saving the subsequent expenditure of $600,000, besides avoiding a great deal of heartburning and bitter disappointment. The result from these ten samples showed a value more than twice as great as that which the ore yielded when treated in the works.

The second example was that of a mine opened up by 500 to 800 feet of drifts and winzes, which was to be examined by the metallurgist who expected to smelt the ore. Wishing to make the examination on the way from one mining town to another—a distance of about sixteen miles, with a high ridge between—and complete the investigation all in one day, he took all the samples, when Mr. Vezin made the map of all the openings. The result obtained by the metallurgist was thirty ounces of silver to the ton as the average. Later, when he had partly completed the smelting works, and brought down lots of twenty and fifty tons of ore, he found that it uniformly contained eleven ounces to the ton, and then admitted that he had made the mistake of simply taking the average of his samples, to which may be added that he did not take enough at each place.

In Mr. Kirby's interesting article on sampling at mines, published in the MINING AND SCIENTIFIC PRESS three years ago, the weight or influence of a few samples is, Mr. Vezin thinks, much too far-reaching. Adapting some of Mr. Kirby's rules, as he remembers them, to the ore bodies in Leadville, the result can only be disastrous, as was the case when a distinguished mining expert was examining a mine for intending purchasers in the East. Taking the map as made by Mr. Vezin at that time, and then drawing lines across as limiting probable ore chutes, determined by the thickness of the ore at two points far apart, cutting down this thickness to one-half or a quarter, and assuming the value much less than he supposed he had found, then measuring the surface of the chute "by the acre," he obtained a value of ore in sight three or four times as great as that which was afterwards taken out up to the time when the mine was exhausted.

In examining some mines in southwestern New Mexico, Mr. Vezin followed the simple method of taking sufficiently thick slices from the vein at regular intervals. The ore was very hard quartz, with gold and silver distributed irregularly through it. The samples had to be broken up by handhammers and gradually reduced. The quantities taken were very much smaller than those suggested by Mr. Porter, and the result was so close that nobody ever found more in the vein after Mr. Vezin had made the examination, though his result was less than one-half of what anybody else had found before. He was able, with two miners, to take and reduce in quantity three or four samples per day. The average was about $20.30 per ton. As a precaution against salting, the rejected portions of the samples were thrown together, each one being measured by the number of shovelfuls, as there was no means of weighing the same. These portions were mixed, cut down, crushed, the average value of the same determined by calculation and the sample of the whole lot assayed. The assayer's return gave a value of $17.80, while by calculation with the crude method of measurement adopted, the average was $21.60. The arithmetical mean of the values of the samples, of which there were ten, was $20.60, or nearly exactly the same as the value of the calculation. Owing to the nature of the ore, it is quite likely that $21.60 was much nearer to the true value than the return by the assayer of the sample of all the rejected portions. A re-assay of this might give a somewhat different result. The main thing is, that his return showed that there could have been no salting of any of the samples. These results, of course, do not necessarily show the average value of the vein, since the thickness of the same, which varies from 14 to 44 inches, was not brought into the calculation in the rejected portions. That the average of the vein and the value of the rejected portions should be so nearly alike is purely accidental.

Mr. Vezin does not think that it requires any extraordinary intelligence or skill to obtain approximately correct samples. Any handy man can be taught how to do so, and in a few lessons. All it requires is care and patience.

To Test the Purity of Water.

As it is sometimes necessary to know the ingredients of water used, a few simple methods for testing its purity are given:

To know whether water is hard or soft, dissolve a little white soap in alcohol and add a few drops of water under investigation. If the alcohol turns milky, the water is hard; if either unaltered or simply cloudy, it is soft.

To detect a copper percentage, add a little filing dust of soft iron to the water, leave it in for a few minutes and add a few drops of sal ammoniac. A blue colorization betrays the presence of copper.

For detecting carbonic acid, a small quantity of water is mixed with a like quantity of lime water. If carbonic acid is present, the fluid turns milky at once. Hydrochloric acid causes the turbidity to disappear.

Sulphur combinations are detected by adding a little water to the mercury in the bottle; this is closed and left to stand for a few hours. If the mercury assumes a darker surface, and, upon shaking, separates into grey powder, it is a sign that the water contains sulphur combinations.

Dissolved pure lime is proved by adding one or two crystals of oxalic acid to the water. A milky preparation betrays the presence of lime.

Sulphate of lime (gypsum) is recognized by the white precipitate caused by chloride of barium in the solution. The precipitate is not redissolved by nitric acid.

Alkalies and alkaline earths are detected as follows: Blue litmus paper is colored feebly red in dilute vinegar and dipped in the corresponding water. If the former blue color is restored, the water is alkaline.

An iron percentage is recognized by a few drops of nutgall decoction, which are added to the water. If iron is present, the water assumes an inky grey to black color. Also one drop of solution of ferro-cyanide of potassium colors ferruginous water blue.

Acids are ascertained by dipping a small piece of litmus paper in the water. A red colorization betrays their presence.

IF one has a pattern made of soft pine put together with nails, an iron casting made from it will weigh sixteen pounds to every pound of the pattern. If the casting is of brass, it will weigh eighteen pounds to every pound of the pattern. A metal that will expand in cooling is made of nine parts lead, two parts antimony, and one part bismuth. This metal will be found very valuable in filling holes in castings.

Electricity at the Transmississippi Exposition.

It is to be regretted that central and northern California are not to be appropriately represented at the Omaha Exposition. Southern California has made suitable provision therefor, and will be benefited thereby.

The electrical exhibit at the Transmississippi Exposition will be of unusual interest and value, showing the practical progress made in electrical science as applied to the uses of commerce, industry, mechanics, and the household, showing the highest achievements attained in that line.

T. A. Edison is now preparing an Edisonian exhibit at Orange, N. J., for the exposition, embracing a series of inventions and practical applications of known principles to the reclaiming of the iron in low-grade magnetic ores, and the treatment of gold and silver ores of low grade. The system of vacuum tube lighting will be demonstrated. While electricity is a source of heat, this is the nearest approach to the solution of the problem of light without heat.

Lieut. Squier will exhibit his syncronograph, by the aid of which the operator can transmit the contents of an ordinary newspaper inside of an hour's time.

The recently discovered appliances for the use of the army will be shown, including the system of military telephones which is calculated to aid the commanding general who directs the operation of an army corps in a future battle. By means of this apparatus, it will be possible to string a line of wire from point to point of an army's communications, and use the same wire for both telephoning and telegraphing. General Greely has declared it to be the most scientific advance of the year, the importance of which is not confined to military work alone, but may be applied the world over. The whole outfit weighs only sixteen pounds, including battery enough to work over any length of line that the corps would probably be called upon to operate. An operator may, therefore, easily carry in his hand a combination telegraph and telephone office. With it, while one operator is engaged in telegraphing a message in Morse characters, another may, over the same wire, talk telephonically with another station, the distant operators hearing only their own messages.

Telegraphing at sea without wires will be practically demonstrated by means of the apparatus of Marconi, the Italian electrician, who claims to be the inventor of the wireless telegraphy. The singular feature of this method of telegraphing is shown by a wire extended vertically in the air, connected to a radiator on the ground. Messages without wires have been sent a distance of twelve miles to a ship at sea. By simply increasing the height of the vertical wire the influence of the machine can be extended over a distance augmenting in geometrical ratio to the increased height of the wire.

The third-rail system will be exemplified by a working exhibit consisting of a line of railway 137 feet in length. By means of a third rail more safety in electric railroad and trolley travel is said to be assured. Cars operated by this system can be reversed under full headway, even on grades and curves, or they may be stopped within one-half of their length. It is considered entirely feasible under this system to attain a speed of a mile a minute or sixty miles an hour. The cars in this system carry beneath the seats a series of small storage batteries supplied from the feed current.

Horseless carriages, cabs and vehicles of all sorts, electric fire engines, trolley records, electric saddle pads for horse racing, electric lamps, day and night car signs, use of electricity in mills, offices, and for up-to-date cooking, heat and light, will serve to show the possibilities and limitations of one of the mightiest natural forces of the earth.

Butte and Anaconda, Montana.

Butte, Montana, is the largest and busiest metal mining center on the continent. It has occupied for some years the same position that Virginia City, Nevada, assumed from 1871 to 1880. Water, fuel and transportation are abundantly supplied, copper, next in demand to gold, is the chief product, and Butte has the present rare distinction of possessing silver mines that pay dividends—of course, largely as a "by-product."

About 5000 men are employed in and about the mines of Butte; the daily output of ore is 7000 tons. On this and the opposite page are depicted from the columns of Butte's mining paper, the Butte *Miner*, scenes familiar to many mining men. Interior views are shown of the Anaconda smelters, which employ nearly 2000 men. The Anaconda group of mines gives an average daily output of 3600 tons, which is treated in the company's smelters at Anaconda, twenty-seven miles from Butte, transported there by the trainload. The largest locomotive in that region lets the loaded cars down on the hill line from the mines to Rocker, and other locomotives there haul them to Anaconda. The smelting plants are complete, the refinery alone costing $1,500,000. The entire plant cost nearly $10,000,000, and consumes 400 cords of word and as many tons of coal every twenty-four hours.

With a few exceptions, the mining companies operating in Butte refine their own product. This branch of the mining industry was established a few years ago, after the magnitude of the mines had been fully established. The Parrot was first to add a refinery to its plant. Besides the gold and silver output, the latter company produced 16,000,000 pounds copper in '97.



FURNACES IN SMELTING WORKS AT ANACONDA, MONTANA.

The Desert Mines.

Stretching northward from the Sierra Madre range, and occupying the entire northern portion of Los Angeles and San Bernardino counties, and the southeastern portion of Kern, Riverside and San Diego counties, is the extensive region popularly called in southern California the "Desert." In distinct contrast to the fertile southwest corner of the State, it is an area of isolated, barren mountain ranges, approached for the most part by long washes which, in some of the ranges, run almost to the summit. Each range is separated from its neighbor by greasewood-covered valleys, dotted with dry lakes on whose alkaline surface not even a salt weed can grow. Water is scarce, but the quality generally very fair, except in the neighborhood of the saline lakes, where it is somewhat brackish. There is no fuel of any value, except the occasional clumps of mesquite and willow found on the banks of the Mohave and Amargoza rivers, and the yucca, of which patches are scattered at wide intervals. "Sandy" is the answer whenever one asks what sort of road there is to any point on the desert, and wide-tired wagons are the only type suitable for desert travel, and the patient and hardy mule is found to be best suited to the long journeys.

It is only to be expected that the development of mines under the difficulties imposed by remoteness from railway transportation, scanty water and fuel supply, and poor roads should be a slow and expensive process; and if we add to these difficulties that of at times extreme heat, we can give due credit to the men whose energy and persistence have enabled the desert to make such a good showing as a mineral region.

The rapid development of the Rand district is familiar to every one interested in mining, and the work so far done has shone that an extensive mineral zone exists there, so that although there will be places and workings where the veins will pitch and apparently disappear, further exploration can be undertaken with a reasonable certainty of picking up the vein, as is the case with most of the mother lode mines in Amador and Calaveras counties.

The Golden Cross at Hedges, sixteen miles from Yuma, is a good example of what can be accomplished in surmounting natural difficulties. The mine is in the side of a high, barren mountain, not a drop of water in sight, and to all appearances not enough wood to cook a dinner. Yet capital, backed by lots of pluck and faith, has made it a productive section. The company owns its own pipe line, eleven miles long, and its own pumping plant on the Colorado river; and fuel, though scarce, has so far been obtained within fourteen miles of the mine in sufficient quantities to run a 70-stamp mill.

The mineral wealth of the desert region does not lie entirely in the precious metals. An extensive copper deposit is being developed at Pilot Peak, thirty-five miles northeast of Daggett, on the Santa Fe line, and in the Resting Springs district, just across the north line of San Bernardino county, in Inyo, are the Noonday and Gunsight lead properties, well developed and ready for work as soon as railway transportation shall enable them to sell their product to smelters at a profit. This region, which lies near the east arm of the Amargosa river, was worked early in the 70's, when everything had to be transported from Newport landing by mule teams. It took two weeks to haul the base bullion to the coast, yet, with silver at $1.29, the mines paid dividends for some time. In the same district are many other lead properties and rich silver-lead properties which could be made to pay even now if a railroad could be brought within twenty miles of them. Besides these, there are extensive deposits of rock salt and nitre in this district awaiting cheap transportation, and from present indications it will not be long before they get it. Mines of this character are a greater inducement for a rail-

road than gold or silver mines, because while the precious metal mines furnish some outgoing freight, yet there is very little return freight. Lead, copper, borax, salt and other minerals of like character have return freight for a railroad, and hence are more profitable to it. As to the character of the gold and silver veins in that region, the prevailing opinion, based on experience of the Amargosa, Ibex, Confidence and some other mines less developed, seems to be that the veins, although not generally over 4 feet wide, are fairly continuous, and carry good value. Several fortunes have to be hauled to the rivers for treatment, and where electric power is impracticable gasoline seems at present to be the best solution of the power problem, and when intelligently manufactured by experienced mechanics and operated with reasonable care gives, within its limits, the most economical results obtainable outside of electric power.

In brief, the power problem and that of cheap transportation are the ones to be solved in developing a paying property on the desert. There, as elsewhere, ledges are found in the most unexpected places, and the successful



UNDERGROUND SCENES IN BUTTE, MONTANA, MINES.

The upper left hand corner shows men inspecting the mine 1500 feet under ground—The upper right hand corner shows the face of a drift 1000 feet below the surface—In the wer left hand corner is a scene at lunch time on the 1500 level—In the center below are two men discussing outside affairs on the 1000 level—At the right is the diamond drill at ork 1200 feet below the surface.

re said to have been made from the margosa, yet its deepest known workgs are not below 70 feet. The Ibex, tuated in the Argus range on the ast side of Death valley, is said to ave paid even with wood at $40 a ord. But it can be stated as a gen·al proposition that in this district, s in most others on the desert, gasoe or other condensed fuel must necsarily come into use for continuous ork. The wood supply is scanty and idely scattered, and the water generly very injurious to boilers. With ailway facilities it is probable that ithin certain distances fixed by elecical conditions in each particular case ectric power generated at central ations along the railway can be used ith economy. Concentrating ores will prospector must needs work closely and carefully. The country, being open and free from brush, is easy to examine, and anyone who has traveled the desert sufficiently to know where to find water when he needs it can travel through the country with safety, even in summer.

If the supervisors of the counties containing desert lands could only be induced to sink artesian wells, instead of the present dry lake wells, and erect proper tanks and pumps over the same when dug, travel over the desert would be relieved of the great inconvenience of "foul" wells, and the lot of the traveler on the main roads would be pleasanter. But these matters will, no doubt, be rectified in due time. Franklin Booth in Los Angeles Review.

Good Foundry Practice.

Mr. E. J. Baker of the Northwestern Wire Mattress Company, Kenosha, Wis., in the February number of *The Foundry* gives the following account of the foundry practice at that establishment:

"The time of melting and the dimensions of our cupola also vary from established practice. Our cupola is a Whiting No. 2½, 41-inch shell, height of charging door from tap hole 9 feet 6 inches, number of tuyeres six, two lower and four upper; lower tuyeres are 18 inches from the bottom, while the upper tuyeres are placed 15 inches higher. The cupola is lined with two course of brick, and an additional lining of sand, rammed firmly around a tapered plug 14 inches at bottom and 17 inches at top. Our object in lining the cupola to such a small diameter is to save coke, and is also made necessary by the fact that we need a steady quantity of iron throughout the day, instead of a larger amount in a few hours. We have no set quantity to melt, as changing conditions, frequently occurring throughout the day, have to be met by a corresponding change in the cupola practice. The class of work we manufacture is small chill castings, the largest not exceeding four pounds weight. As all the iron is taken away in hand ladles, holding from thirty to thirty-five pounds, and has to be carried up to about 90 feet from the cupola, it is an all-important point that the iron shall be hot, as it must be poured very slowly.

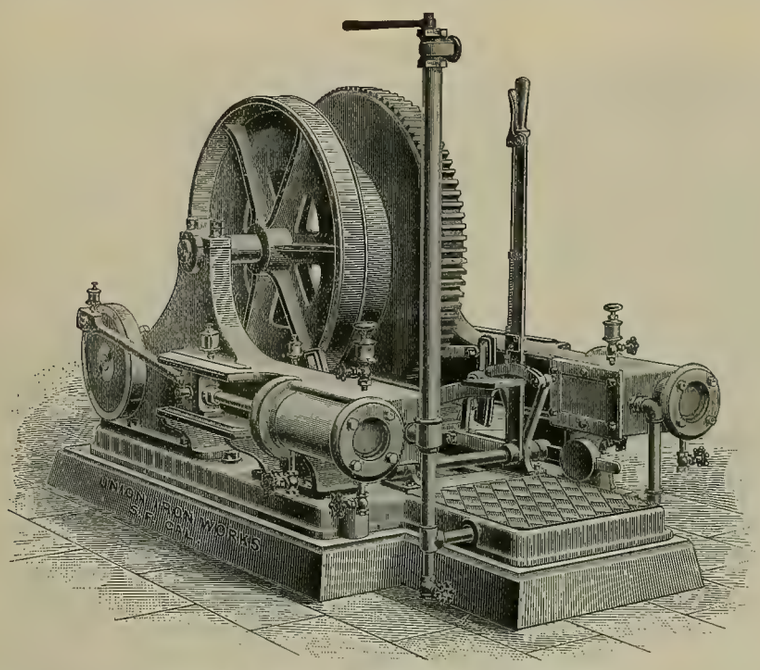
"Our practice is to start the fire in the cupola at 4:30 A. M., with from 250 to 300 pounds of coke on the bed, on which is charged from 100 to 125 pounds of pig and 300 pounds of scrap. The blower is started at 6:30 A. M., the following charges being made up of 30 pounds coke, 100 to 125 pounds pig and and 400 pounds scrap, with from 15 to 25 pounds of limestone to each charge. The slag is removed, as fast as accumulated, through the slag hole, which is kept open all day. At noon the tap hole is knocked out large enough to allow the remaining slag to be blown off, when the cupola is filled up with coke, from 250 to 300 pounds being required to put it in condition to receive the first charge following the noon hour, after which the practice of charging is the same as already explained of the forenoon. We melt until 6 P. M., when, instead of dropping the bottom, as is usual, we knock out the breast, which is built of coke and sand, having a plate and strap to hold it in position. This part of our practice becomes necessary owing to the small diameter of the cupola. The sand bottom is heavy and built steep so as to run the iron directly to the tapping hole."

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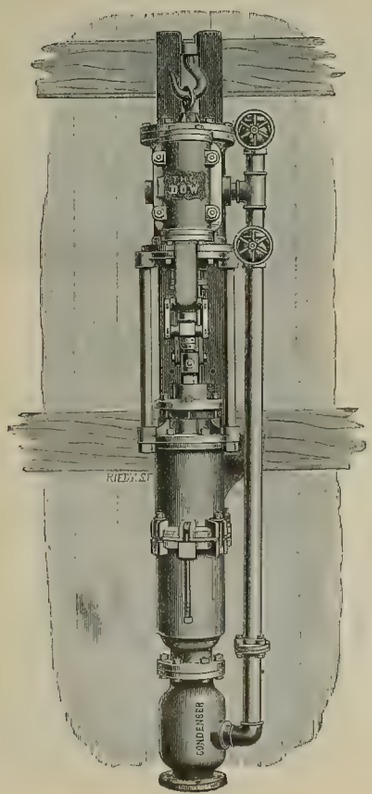
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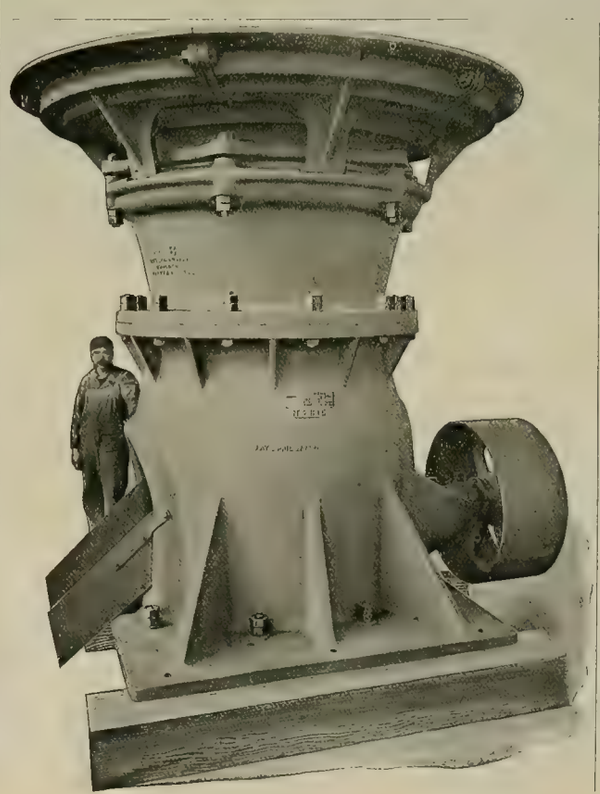
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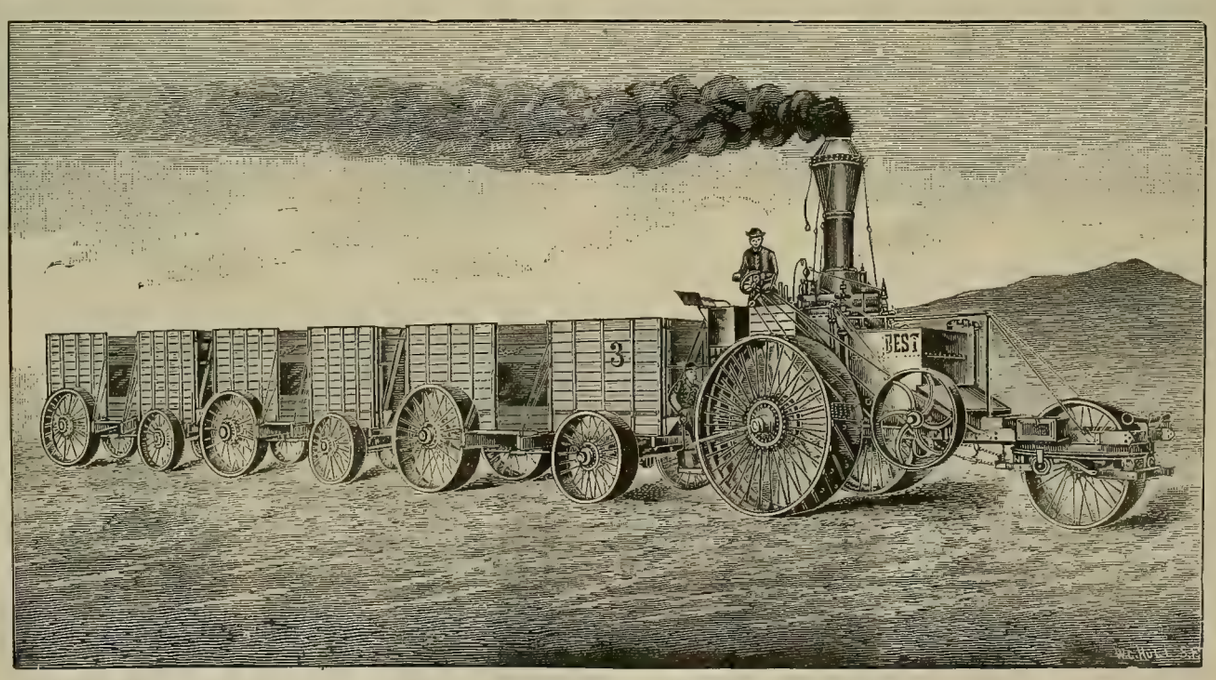
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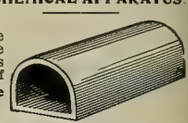


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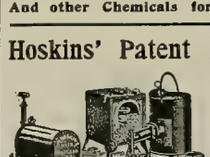
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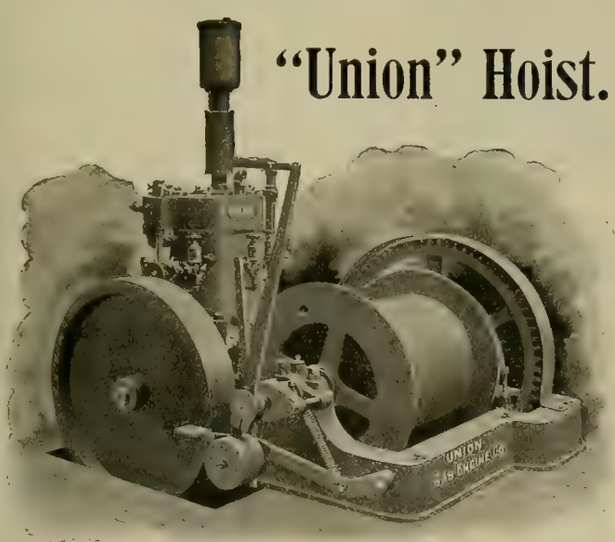
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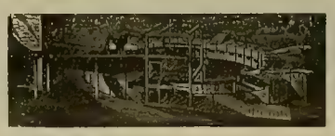
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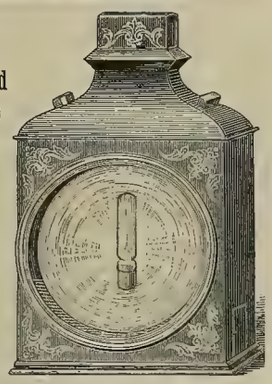
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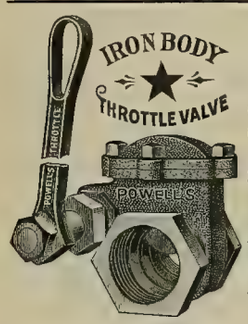
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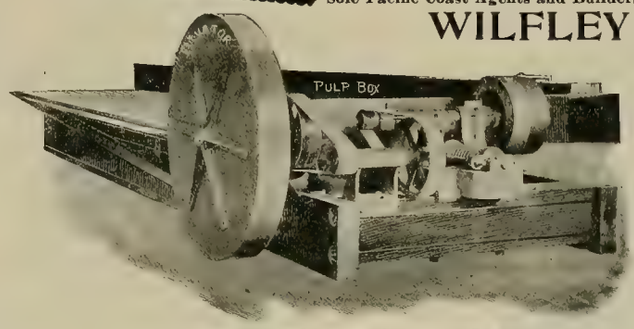
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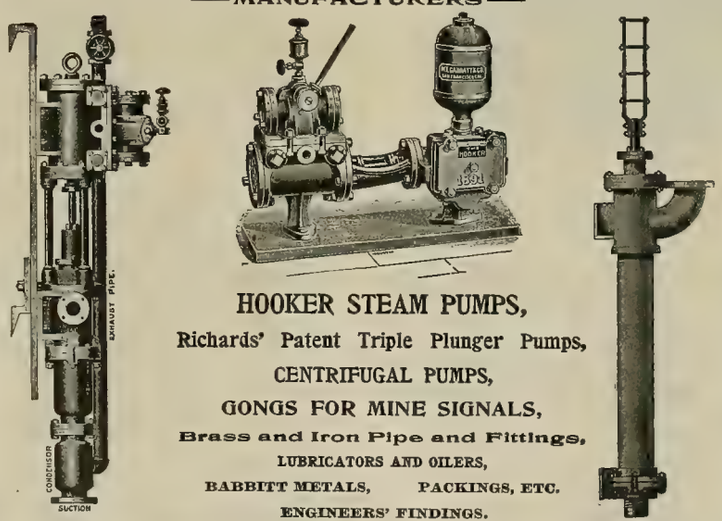
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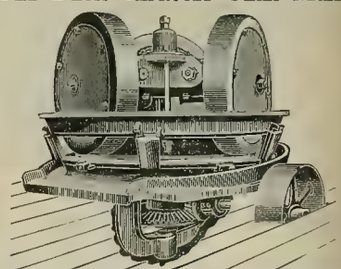
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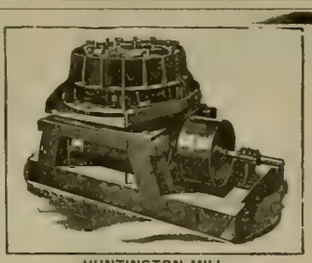
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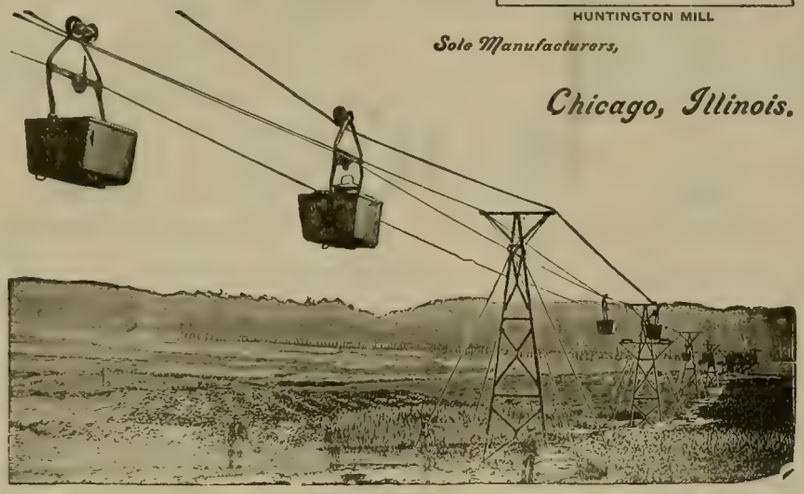
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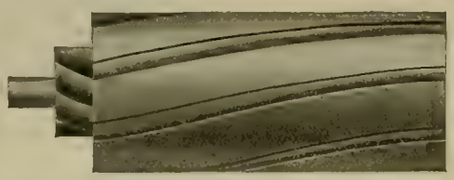
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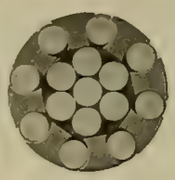


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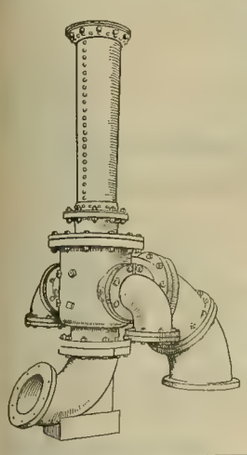
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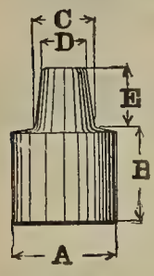
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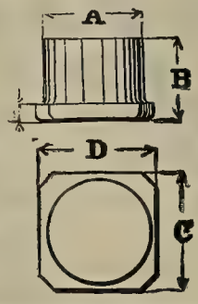
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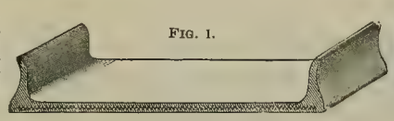
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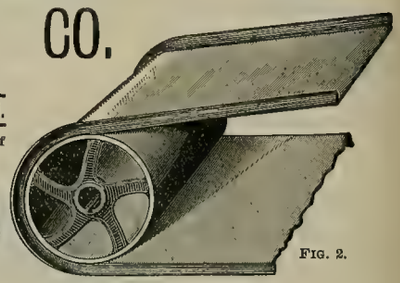
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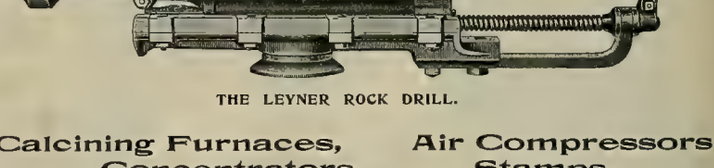
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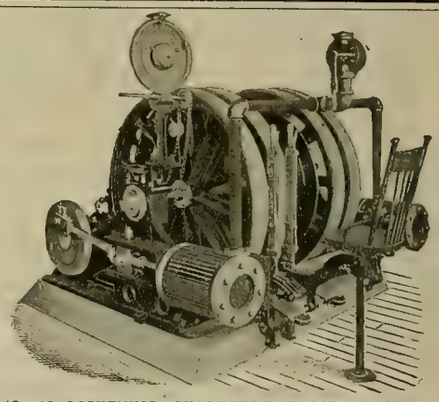
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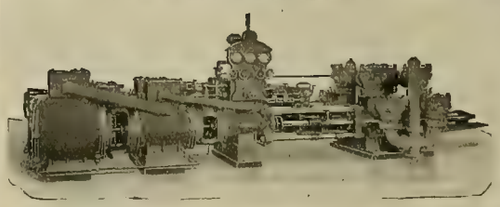
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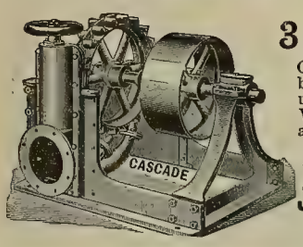
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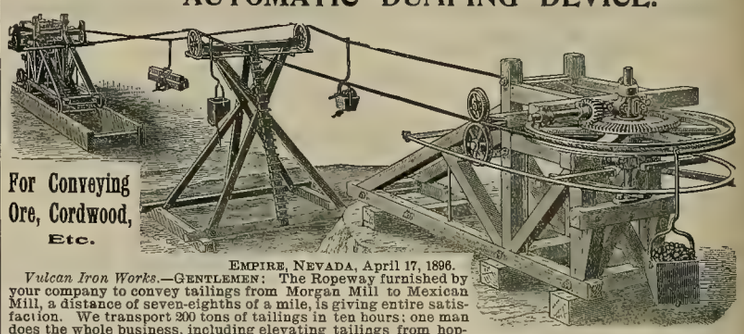
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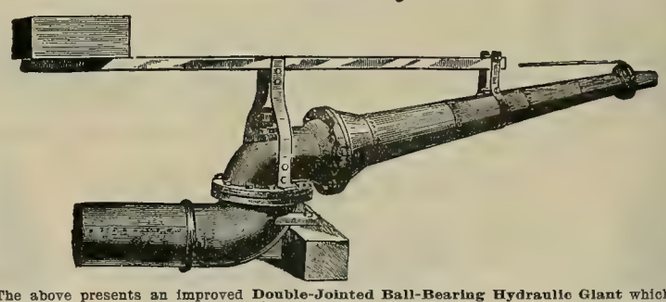
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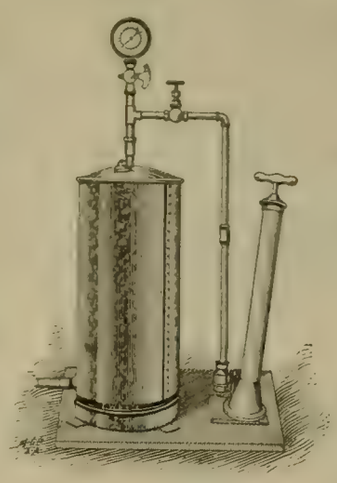
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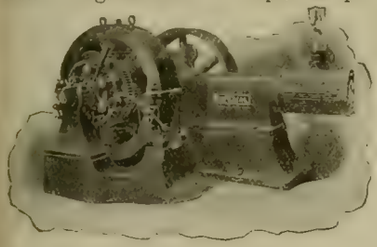
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WRITE TO-DAY and let us make an estimate on your next order for LUMBER, SHINGLES, SHAKES and R. R. TIES. We make a specialty of MINING TIMBER and PLANK for Arizona and Mexico shipment.

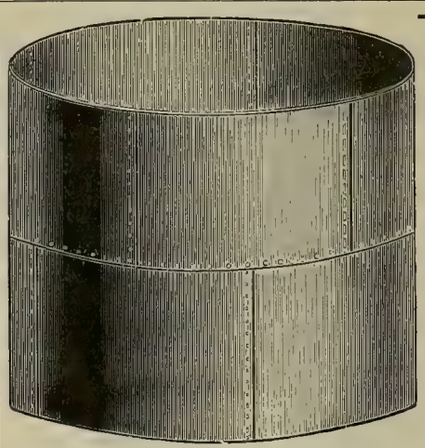
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THOMSON & BOYLE CO.,
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Market Reports.

The Markets.

SAN FRANCISCO, March 3, 1898.

Jobbers report that trade outside of the demand for outfitters for Alaska and the Northwest Territory does not show any improvement over the corresponding time in 1897. They say that the buying by retail distributors is on conservative lines which necessitate almost constant sorting up. It is expected that the call from the more favored farming and fruit sections will show a steady increase from now on until towards the close of harvest. The higher temperature will make easier travel and prospecting in the more remote mining districts. It will cause more general activity in all other districts; this will cause free buying of goods of all description. The ship and steamboat building yards are running to full capacity on vessels adapted to the Alaska service. This calls for more hands and also for machinery. The foundries and machine works are busier than at this time in 1897, with the outlook favorable for continued activity. The Government's calling for powder is causing one of the factories to run full time and full-handed on smokeless and black powder.

The local money market is practically unchanged. The banks report continued accumulation of idle money, yet while they extend accommodations to patrons they are not disposed to put out money outside of this unless on best approved security. Steady exporting of grain on which advances have been made is untying considerable money each week which is going into the general reservoirs. It looks now as if considerable more money will be employed this year for crop purposes owing to the outlook being favorable for an outturn of fruits fully one-third larger than ever before, of sugar beets in excess of last year and more wheat than in 1897. The increase will be still greater if we have the usual spring rains, particularly in the southern part of the State. The closer money market at New York seems to have given way to ease. This change is due to fears of war having subsided and also to gold being drawn from Europe. The ease at the East is reflected in higher market values for American securities.

New York Silver Prices.

NEW YORK, March 3.—Following are the closing prices for the week:

	Silver in— London.	N. Y.
Friday	25⅝	55⅝
Saturday	25⅝	55¼
Monday	25½	55¼
Tuesday	25½	55
Wednesday	25⅜	54½
Thursday	25	54

	Copper.	Lead.	Iron.	Tin.
Fri.	11 40 @11 60	3 80	9 75@12 00	14 15
Sat.	11 62½@11 75	3 80	9 75@12 00	14 15
Mon.	11 75 @12 00	3 75	9 75@12 00	14 20
Tue.	11 80 @12 00	3 75	....@....	14 20
Wed.	11 85 @12 00	3 72½	9 75@12 00	14 17½
Thur.	11 85 @12 00	3 75	9 75@12 00	14 15

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans, gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	17½ Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.82¾
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	.54
Mexican Dollars nominal	46@—

SILVER.—The market has sold down throughout the week with a weak closing as if still lower figures will be touched. Some of the bankers informed on the market look for a 50 cent price, if not less. This low figure will cause many mines to close down, but this may be offset by an increased outturn by copper mines owing to the high and strong markets for copper stimulating the production. Russia has for the present, at any rate, had her silver wants met and with that government not buying supplies necessarily increase in the absence of a corresponding increased call from any other source. Shipments of silver from Atlantic seaports to Europe are quite heavy and unless placed before being exported must have an unfavorable influence. The steamer hence February 25th took out $104,000 in bullion.

MEXICAN DOLLARS.—The market is stagnant and quotations entirely nominal owing to the decline in silver. The last steamer hence for China took out $30,327 worth. This is a light shipment.

COPPER.—The markets have advanced quite rapidly the past week, closing strong at the East and in Europe, with the tendency to still better figures. The advance confirms the position taken by the MINING AND SCIENTIFIC PRESS as early as December of last year. The ending of the engineers' strike in London brought in a large amount of deferred work calling for copper, which, with increased requirements of nearly every nation abroad for war-footing purposes, have run the stocks abroad to low figures, and this, too, in the face of increased shipments from the Atlantic seaports. The consumption in the United States is on a much larger scale, also, which aids very materially in depleting available supplies. If the markets should advance another cent and show signs of holding, many of the idle and more expensive mines will start up. Imports the past week were 1284 ingots from Seattle.

Our market is quoted as follows:

Ingot casting, jobbing	13⅛@—
Ingot " wholesale	13 @—
Sheet copper	16¾@—
Bolt	¼ and 5-16, 20c; ⅜ and larger, 16½

TIN.—The stronger markets at the East were only temporary, for with no speculative demand more urgent trade wants were met, when an easier tone was noted.

The market is quoted in jobbing lots as follows:

Pig	4 75	@	5 00
Sheet	....	@	6 50
Pipe	5 30	@	5 80

LEAD.—Our market is quiet and easy. The East reports dull markets, but at the decline smelters are not pressing for sales. Our Eastern exchanges look for an active consumption.

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, "	4 00@—

SHOT.—Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

QUICKSILVER.—The market is firm at an advance. The last steamer for Mexico took out 50 flasks.

Our market is quoted at $40 for domestic consumption and $38@37 for export to the west coast of Mexico.

IRON.—The market is about the same as it has been for some time past. The consumption shows a slight increase. The East reports dull markets, with quotations easier for buyers.

COAL.—The consumption of both steam and house shows quite a falling off, and as receipts are good, with considerable to arrive, the market is in favor of buyers of round lots. Receipts of coal for the week ending with Tuesday were as follows in tons: Comox, 2400; Puget Sound, 12,351; Newcastle, N. S. W., 4282; Coquille river, 75; Philadelphia, 1950; Coos Bay, 615. Total, 21,673 tons.

POWDER.—The Santa Cruz factory is running largely on Government orders. Our market for mining is strong, with the demand improving.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

PLATINUM.—The market is steady. Our market is quoted in a jobbing way at $16 per ounce and for scrap $11 per ounce.

ZINC.—The market is steady. Our market is quoted at 10@15c, according to thickness.

ALUMINUM.—The market is steady. We quote in jobbing lots at 45@50c per pound for ingots.

BORAX.—Continued free exporting by rail to the East is reported. There was shipped by water 200 tons to New York, where the market is strong, with supplies light.

The market is quoted as follows:

Refined, in carload lots, in barrels	7
Refined, in carload lots in sacks	6¾
Powdered, in car lots	7
Concentrated, "	6¼

Chemicals.

The market is in about the same condition as it has been for several months past, although a slightly improved call is reported from consumers. At the East nothing new comes to hand. The demand there is said to be quiet in all lines, except nitrate of soda, which fluctuates daily in price.

CYANIDE OF POTASSIUM.—The market is steady. Our market is quoted for chemical pure, 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The market is firm. We quote in a jobbing way at 1½c per lb. for 66%.

ACETIC ACID.—The market is firm at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BONEASH.—There is a good demand for export. Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady. We quote in a jobbing way at 4c per pound.

SPELTER.—The market is steady. We quote our market in a jobbing way at 5c per pound.

BISMUTH.—The market is firm. Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (Le Blanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—The market is about the same as it has been for a month past. Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady. We quote in a jobbing way at 70 to 75 cents per pound.

Mining Share Market.

SAN FRANCISCO, March 3, 1898.

The market has been stale, flat and unprofitable to all except the inside pool, which, if indications and reports are correct, has been taking in about all the shares thrown out by disgusted holders and many of those sold by persons that have gone or are going to Alaska and the Northwest Territory. There is nothing allowed to leak out from the mines which is calculated to excite the cupidity of outsiders into buying, but it seems as if a contrary policy is being pursued, so as to make them sell. There are some outsiders who have been quite successful in their operations on 'Change that have been quietly picking up shares at the low ruling prices. Their experience has proven correct—that, to beat the game, is to buy when such shares as Ophir, Mexican, Union, Best & Belcher, Gould & Curry, Challar, Potosi, Yellow Jacket, Crown Point and Belcher sell at such absurd low prices as they are at present. They claim that, even with another assessment added, they are still cheap, and that experience in the market has taught them that before three or four months pass quite a good-sized profit is realized from the investment. They say that in no other way can a larger return be had from the money they put in them. They also state that the market has been "sat on" for over a year, and, under assessments, scare reports and a low-dragging policy, only relieved by short-lived rallies, the outside public have sold the most of their holdings. If these views are correct, and they appear to be reasonable, then an up-move can be looked for when the line of assessments that is being put on is off. The writer has yet to see the market fail to recover from such a long drag and almost continuous assessing. If there was no certainty of its not going up again, and on ore finds, too, John W. Mackay, D. O. Mills, Col. Hayward and others who ought to know what there is in the Comstock lode would sell out their holdings—railroads, mills, water franchises, etc., not to say holdings in a pool of lines of shares. It is the current belief on the street, grounded on the past, that no outsider can get control of any of the more desirable mines, particularly those that hold the key to the underground workings. The more important work in Sierra Nevada is delayed by moving the ore dumps from the upper to the lower tunnel. Some claim they will develop quite a body of ore. Standard, in the Bodie district, has declared a 10-cent dividend.

From the Comstock mines "grape vine" telegrams of a bullish nature are as scarce as inside information. There seems to be always a scarcity of news when the market is dragging around bottom, but there is no lack of discouraging news. They are driving ahead in the northwest drift in Utah, with no change of formation reported. In Sierra Nevada they are making a two-compartment raise from the tunnel level, which indicates that more ore has been found in the upraise than had been expected. They are driving the Riley tunnel ahead. They are extracting a few tons of ore while upraising. On the 900-foot level there is no change in the work or formation. In east crosscut No. 2, 900-foot level of Union, a slight seepage of water is reported. The formation is clay and porphyry. In Mexican the only work reported is on the 1000-foot level to the east. This crosscut is in nearly 800 feet. There is no change in the workings or in the formation of the ground encountered in Ophir on either the 1000-foot or Central tunnel levels. The west crosscut on the former level is in about 925 feet, and in the latter level the west crosscut is in about 450 feet. The formation is favorable. In Andes they are going in a northeasterly direction on the 175-foot level. They are in about 40 feet. In Con. Virginia no change is reported on any of the levels. They appear to be actively engaged in prospecting on and around the 1550-foot, 1650-foot and 1750-foot levels. They seem also to be laying the foundation for more important work later on. Best & Belcher and Gould & Curry are still running jointly the east crosscut on the 800-foot Bonner shaft level. From Savage nothing new comes to hand. In Chollar they are still putting in timber in the main incline at the 1100-foot level. The west crosscut from the upraise from the 100-foot level is in about 55 feet. At last advices they were in ore giving from $8 to $10 a ton. Potosi's official letter reports they are still repairing the old Crœsus shaft and, jointly with Bullion, driving the south drift ahead. It is in about 520 feet. In Alpha they are running a west crosscut from the upraise above the 500-foot level. This will strike the ore found to the west on the 500-foot level and also give good circulation when connections are made to the west. Nothing new is reported from the joint west crossdrift of Con. Imperial, Confidence and Challenge. They ought to be in the vicinity of the west lode. From Yellow Jacket nothing is allowed to leak out. It is reported in Virginia City that important work is being done, but down here they say it is to be done. In Belcher they are driving ahead on the 1200-foot level a north drift and an east crossdrift. They are extracting about six tons of fair ore a day. The Mexican mill is running on a 250-ton test of low grade gold ore and the Nevada mill on a 300-ton test. When this is done it will mean a good test of the two methods of concentration. Nothing new from Seg. Belcher or Overman. From the latter they raise about one ton of fair grade ore a day from the 900-foot level. From Caledonia more favorable news is looked for before long. In Justice the west crossdrift turned the last week in a southeasterly direction and struck an 18-inch vein of ore going $107 to the ton, of which $35 was gold. They have milled 50 tons of ore, with battery assays of $7.70 gold and $14.89 silver.

On the Brunswick lode work seems to be energetically pushed by Occidental, Potosi, Savage and jointly by Best & Belcher, Con. Virginia and Gould & Curry. It looks as if the Occidental management is satisfied with the prospects and is opening up quite an area of ore for extracting. On one of the levels they are in a good-sized body of $8 to $10 gold ore, the same as they have in Crown Point. At other points they are developing ore that assays higher. They are going west on the 550-foot level, south on the 750-foot level, and sinking on fair-grade ore from the 750-foot level. They are running on this level a north drift from the west crossdrift in high-grade ore. In Potosi they have started, or will start soon, to prospect the 35-foot body of quartz struck by the joint west crossdrift about 200 feet back. This quartz looked healthy and lively, and they look for an improvement in the new work. Chollar's official letter reports joint sinking of shaft No. 1. It is down on an incline 1100 feet. In Chollar they are prospecting and repairing on the different levels. In Savage they are drifting north on the 600-foot level. The joint work of Con. Virginia, Best & Belcher and Gould & Curry is confined to the 600-foot level, where they are crossdrifting west and also drifting south. The joint shaft is down an incline about 930 feet.

The following illustrates the changes of the week:

MINES.	Feb. 24.	Mar. 3.
Alpha	....	$ 03
Alta Consolidated	$ 16	15
Andes	11	....
Belcher	23	21
Best & Belcher	39	35
Bodie	....	....
Bullion	....	....
Challenge	....	28
Chollar	....	....
Confidence	....	67
Consolidated California and Virginia	85	83
Consolidated New York	....	....
Crown Point	12	13
Exchequer	....	....
Gould & Curry	20	18
Hale & Norcross	1 50	....
Justice	15	31
Mexican	33	31
Ophir	47	44
Overman	05	....
Potosi	18	17
Savage	26	23
Sierra Nevada	98	96
Union	35	34
Utah	....	....
Yellow Jacket	22	22

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Alpha Con M & M Co, Nev	20	5c	Feb 1	Mar 8. Mar 29	C E Elliot, 309 Montgomery
Baliol G M Co, Cal	2	30c	Jan 26	Mar 4. Mar 28	R L Cheney, Mills Building
Chollar M Co, Nev	45	20c	Jan 8	Feb 11. Mar 8	C E Elliot, 309 Montgomery
Con Imp M Co, Nev	40	1c	Mar 1	Apr 5. Apr 26	C L McCoy, Mills Building
Crown Point G & S M Co, Nev	73	10c	Feb 21	Mar 28. Apr 18	Jas Newlands, Mills Bldg
Fall River Con G Q Co, Cal	11	5c	Jan 15	Feb 25. Apr 21	A Lorsbach, 313-315 Front
Kate Hayes M Co, Cal	6	$1	Feb 25	Apr 5. Apr 26	H Pichoir, 320 Sansome
Marguerite G M & M Co, Cal	9	10c	Feb 19	Apr 6. May 2	F Mettmann, 225 Sansome
N Bloomfield Gravel M Co, Cal	50	25c	Feb 25	Apr 6. Apr 27	H Pichoir, 320 Sansome
Ophir S M Co, Nev	72	25c	Feb 24	Mar 29. Apr 18	E B Holmes, 309 Montgomery
Orleans M Co, Cal	7	10c	Feb 1	Mar 8. Mar 28	Geo O Thurston, 575 Mission
Overman S M Co, Nev	79	5c	Jan 26	Mar 2. Mar 23	G D Edwards, 414 California
Potosi M Co, Nev	49	20c	Feb 5	Mar 11. Apr 4	C E Elliot, 309 Montgomery
Sierra Nevada S M Co, Nev	114	20c	Jan 19	Feb 23. Mar 14	E L Parker, 309 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19	Feb 26. Apr 4	A F Frey, Phelan Building

San Francisco Stock Board Sales.

SAN FRANCISCO, March 3, 1898.

9:30 A. M. SESSION.

500 Alta	15	100 Justice	30
200 Best & Belcher	31	500 Mexican	29
50 Benton	14	200 Occidental	1 55
100 Caledonia	26	200 Ophir	42
200 Challenge	28	100 Savage	23
300 Con Cal & Va	80	1000 Seg Belcher	04
100 Crown Point	12	300 Sierra Nevada	96
100 Gould & Curry	17	200 Union	32

SECOND SESSION—2:30 P. M.

100 Ophir	44	300 Yellow Jacket	22
100 Mexican	31	1000 Alpha	03
200 Gould & Curry	18	100 Belcher	21
100 Best & Belcher	35	100 Confidence	67
100 Con Cal & Va	83	300 Justice	31
150 Potosi	17	500 Union	34
300 Crown Point	13	600 Alta	15

TEN WEEKS FOR TEN CENTS!

Strange as it may seem, that big family paper, the *Illustrated Weekly Sentinel*, of Denver, Colorado, (founded 1890) will be sent ten weeks on trial for 10c.; clubs of six, 50c.; 12 for $1. Special offer solely to introduce the paper. Gold rings set with Rocky mountain gems are given free as premiums. Latest mining news and illustrations of grand scenery each week, also true stories of love and adventure. Address as above and mention PRESS. Write today; postage stamps taken.

WANTED.—Position to take charge of a quartz mine. Am a practical miner, and have had charge of a number of properties in different States for the last 20 years. Can furnish the best of reference. Address J. D., Mining and Scientific Press.

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Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage.

Money loaned mines.

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Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated

Examine mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG,
Marquette, Mich., U. S. A.

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A B C UNIVERSAL COMMERCIAL.

Practical Running of Dynamos.

A little booklet on the Care, and the Locating and Remedying of Troubles in Dynamos and Motors.

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Catalogue B. Mechanical, Electrical and Mining Books sent free.

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A Physician,

Aged 27, unmarried, wants position as company surgeon with a mining or construction company. For two years assistant surgeon in Cook County Hospital, Chicago. First-class references.

Address **R. U. CRAIG,**
Box 172.....Phœnix, Arizona.

To Capitalists.

Several working miners having consolidated 250 acres free and cement gold-bearing gravels, also large deposits South African conglomerate and tailings, will sell all or part. Good water facilities and roads; 4 miles from R. R., 35 miles from Stockton. Address Box 143, Quartz Mountain, Tuolumne Co., Cal.

Working Capital for Mines.

PACIFIC EXPLORATION COMPANY

Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 29-30 Chronicle Building, S. F.

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A GOOD INVESTMENT

Three Dollars Brings This Paper One Year--Fifty-Two Issues.
Can You Afford To Be Without It?

Rainfall and Temperature.

The following data for the week ending 5 A. M., March 2, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week ...	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date ...	Average Seasonal Rainfall to Date.	Maximum Temperature for the Week.	Minimum Temperature for the Week.
Eureka	2 58	26 60	37 69	31 82	62	42
Red Bluff	2 39	11 99	21 90	18 96	74	42
Sacramento	2.50	8 54	14 67	14.72	68	46
San Francisco	1 02	7 32	19 03	17 50	67	46
Fresno	.10	3.45	8 73	7 03	70	38
San Luis Obispo	1.18	5 14	18 03	...	76	44
Los Angeles	.16	4 27	14.73	12 61	76	46
San Diego	.00	3 38	10.17	8.07	70	48
Yuma	.00	1 20	4.87	2 69	84	44

Marsh Pumps at the Mining Fair.

Among the exhibits at the Mining Fair, the Simmonds Saw Co. of this city makes a fine display of Marsh pumps that has attracted much attention from practical mining men and others interested in this class of machinery.

The Marsh compound pump with eighty pounds of steam will raise 30,000 gallons of water 200 feet high per hour. It is a marvel of simplicity and strength.

They also have stationary pumps for mines that are well suited for the work required of them. The boilers which supply steam for the Pavilion are fed by a Marsh boiler feeder, which does its work quietly, also effectively.

As the result of nearly a year's extensive travel and investigation by Mr. Marsh among the mines of the Pacific coast—with a view to learning all the requirements of pumping water from deep mines effectively and at least expense—they show a sinking pump simple in construction, durable and reliable in all respects. It is double-acting and has all the good points of other pumps, besides being much lighter, which is a desirable feature. It has a steam cylinder 12 inches in diameter, water plunger 6 inches in diameter, and a 16-inch stroke, and will raise 150 gallons of water 275 feet high per minute. It will run at a high speed without noise or jar, and it is not necessary to throttle the exhaust, as in the case of some other pumps. It will run equally well with either air or steam.

The self-governing steam valve of all of these pumps compels them to always make a full stroke, and users can depend upon them to do their work effectively at all times. *

Reasons Why Inventors Upon This Coast Are Advised To Consult With Us:

First: Because they have the opportunity to explain their inventions personally and directly to the men who write the specifications and make the drawings, so that they will get all the inventor's ideas correctly and not be liable to make mistakes.

Second: In addition to this we have resident attorneys in Washington, of long experience and high standing with the office, who attend EXCLUSIVELY to our business before the Patent Office. You have, therefore, the advantage of personal consultation in the preparation of the case, and constant attention to your application after it has been filed.

Third: Time is saved. If you send to an Eastern attorney you must depend upon your ability to write a perfect explanation to a person three thousand miles away, wait until the papers can be returned to you for signature, and then send them again to your agent to be filed, if they are fortunate enough not to need further revision and return.

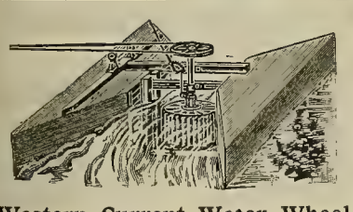
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We attend to all business connected with patents, such as the preparation of Caveats, Trade-Marks, Design Patents, Assignments, Licenses and Agreements. We make examinations as to the patentability of inventions, searches and opinions as to infringements, or the scope or validity of Patents. Our Branch Offices and arrangements for Foreign Patents, Trade-Marks, etc., are very extensive and complete.

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Assessment Notices.

THE ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley Mining District, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1898 an assessment (No. 7, new series) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 575 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. O. THURSTON, Secretary

Office—No. 575 Mission street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of February, 1898, an assessment (No. 9) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office 237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 1 to 4 P. M. at his business office, 225 Sansome street.

NORTH BLOOMFIELD GRAVEL MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North Bloomfield, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 25th day of February, 1898, an assessment (No. 50) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on WEDNESDAY, the 27th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of delinquence in the above assessment notice has been postponed to March 12th, 1898, and the day of sale to MONDAY, April 4th, 1898.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of February, 1898, an assessment (No. 6) of one dollar ($1) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 26th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

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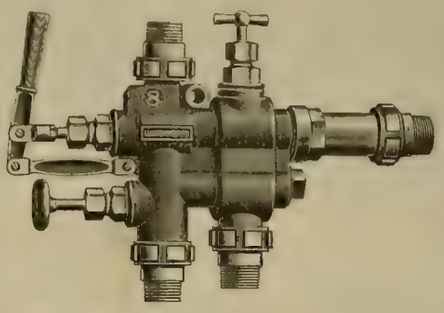
Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; J. Stanley Muir, Technical Manager.

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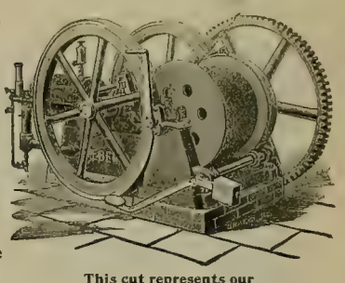


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OFFICE OF GEORGE M. COOLEY,
SAN BERNARDINO, CAL., July 11, 1896.

WEBER GAS & GASOLINE ENGINE CO.,
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GENTLEMEN—I wish to make the following statement regarding the use of distillate in the "Weber" Engine. I connected up my No. 4 "Weber" for distillate, as per your instructions, and find it to be more than satisfactory. In making the test I pumped 108,000 gallons of water at a cost of three-quarters of a cent per 1000 gallons, raising the water sixty-eight feet. This, I think, is a good showing, and one that will make many friends for the "Weber." Yours very truly, GEORGE M. COOLEY.

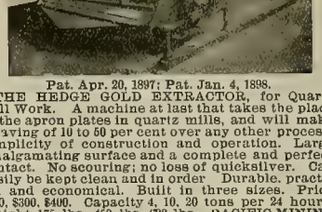
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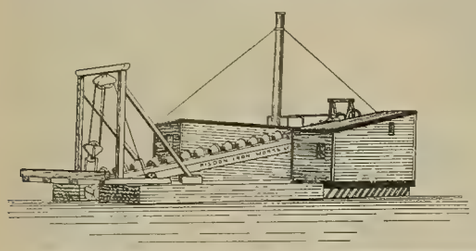
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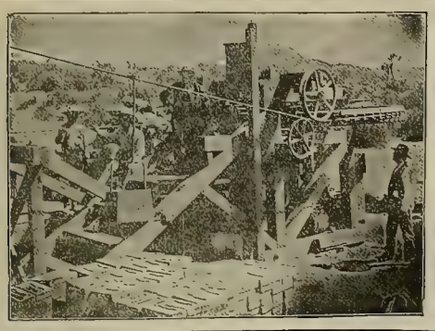
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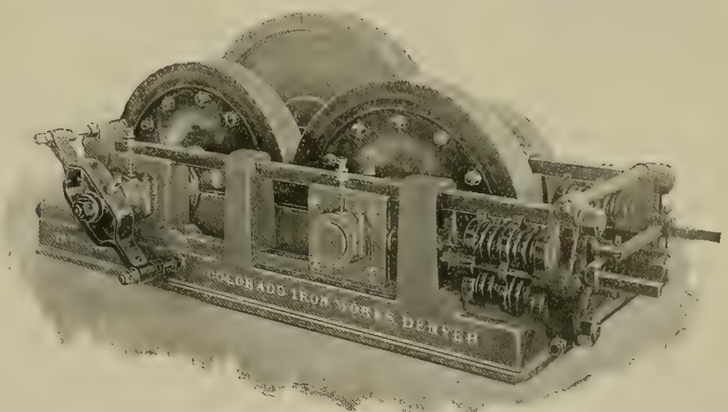
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as being the most efficient and the most economical machine for fine dry crushing ever placed upon the market. The rolls having

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can be fed evenly over the whole width of faces with certainty, and hence the faces or crushing surfaces are easily kept true. Descriptive pamphlet on application.



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Extracts from Letters R[illegible] Philip Argall, Manager the Metallic Extraction [illegible]anide, Colorado:

January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.

"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The **ROPP FURNACE** is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal. (two furnaces); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); Broken Hill Proprietary Co., Broken Hill, New South Wales (four furnaces); Puget Sound Reduction Co., Everett, Washington; Colorado Ore Sampling & Reduction Co., Cripple Creek, Colo.; Consolidated Kansas City Smelting & Refining Co., for the Arkansas Valley Smelting Works, Leadville, Colo.; Robert Lanyon's Son's Spelter Co., Iola, Kansas (two furnaces); Mountain Copper Co., Ltd., Keswick, Cal.

Catalogue on Application.

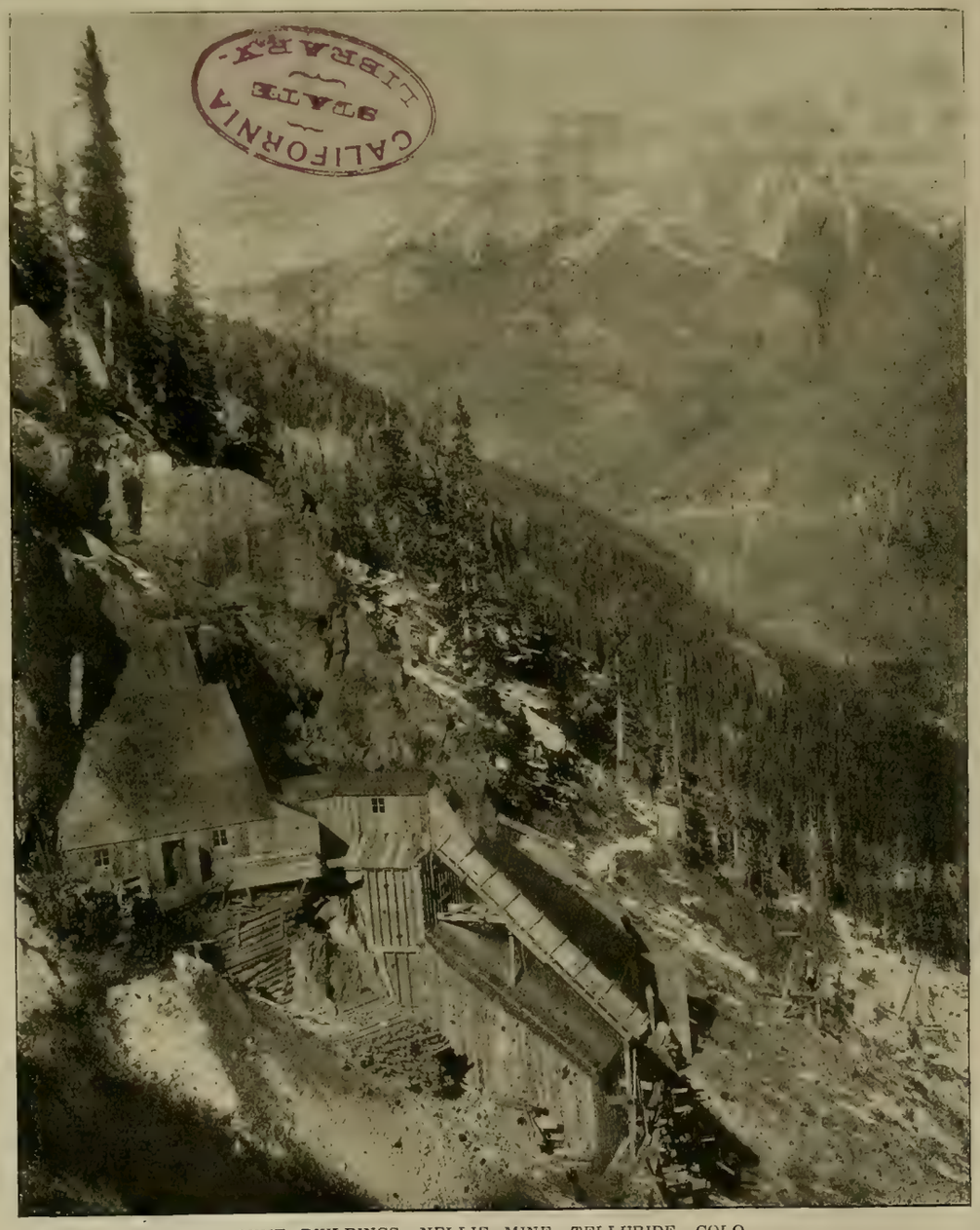
MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1966.—VOLUME LXXVI. Number 11. SAN FRANCISCO, SATURDAY, MARCH 12, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mines Around Telluride, Colorado.

On this and pages 294 and 295 appear illustrations of mining scenes of Telluride, high in the mountains of southwestern Colorado, which tell their own story. This vicinity is the seat and center of large tunnel enterprises. It is also noted as the site of the Smuggler-Union property, a view of the mill appearing on page 295. It is locally claimed that the Smuggler-Union mines contain the most extended ore body yet opened up in the world, being the most remarkable vein for continuity and regularity in the history of mining, producing a regular and valuable output. There are over twenty-five miles of underground workings in the property in the nature of crosscuts, tunnels, drifts, levels, upraises, shafts and winzes. The formation in which this vein occurs is trachyte, or volcanic breccia, found where Marshall creek cuts through the different geological strata, at an elevation of 9800 feet. At the summit, between Canyon and Marshall creeks, the elevation is 13,200 feet, and there the trachyte has a depth of 3400 feet. Below this formation no development work has been done, and the character of the vein after passing into the underlying conglomerate and sandstone is unknown.

The Smuggler-Union Co. has developed this mine at varying depths, in places almost 2000 feet, for a linear distance of nearly 8000 feet, and these workings have disclosed an ore body everywhere present in sufficient quantity and value to warrant continuous stopings. The existence of a continuous ore body carrying profitable values for a length of more than one and one-half miles is most unusual. The vein averages 5 feet in thickness, is seldom less than 2 feet, rarely widening out to 10 feet. The minerals are pyrite, chalcopyrite, galenite, sphalerite and arsenical silver. Native silver is rarely encountered, but metallic gold is more frequent. A remarkable feature is the constant increase in gold values toward the south from the summit of the divide, and a corresponding decrease in silver values in the same direction. On crossing the divide at the extreme north end of the property the gold value in the vein is hardly one-quarter that of the silver, but the transition from silver to gold is almost constant until a mile south the vein practically becomes a gold lode.


CALIFORNIA STATE LIBRARY

MINE BUILDINGS, NELLIE MINE, TELLURIDE, COLO.

Looking down Bear creek. In the distance are high mountains, the "Sawtooth range."

The distance between the fifth and seventh levels, the latter having been driven since it was found advantageous to adopt long chutes, is 260 feet; and it is between these two levels that there is at present one of the largest ore bodies blocked out ever seen—250 feet in depth by 4500 feet in length. It will require several years at the present rate of consumption—200 tons daily—to exhaust this area. The method of mining the ore in this property does not differ from that employed in most of the gold-silver mines of the district. The levels are timbered with stulls, upon which lagging to support the waste produced in stoping is placed. The country rock on the hanging wall is then stripped to a height of 7 feet, and the vein is shot down in mass to be broken up and passed into chutes, as noted in the Telluride *Journal*, to which enterprising publication we are indebted for the illustrations.

Noticeable are the natural advantages for mining by tunnels, basins and gulches in every direction, which enable depths of 300 and 400 to 2000 feet to be obtained on many leads by comparatively short tunnels, which not only open up the vein, but provide an outlet for the ore and drainage for the property. In the Smuggler-Union a vein is cut at a depth of more than 2000 feet below the surface, with not a single pump for hoisting water in the mines, they being practically dry.

The company's mill, illustrated on page 295, is at Pandora, one mile above Telluride, and is connected with the mine workings, the mouth of Bullion tunnel, by a tramway one mile long, capacity 200 tons in ten hours. The mill has fifty stamps of 800 pounds weight that drop 9 inches, ninety-five drops per minute.

During '97 68,000 tons of milling and shipping ore went down. While this ore was coming down there was sent up: lumber, 216,720 feet; lagging, 15,238 pieces; stulls, 3063. The latter timbers are from 12 to 18 feet long and from 14 to 30 inches in diameter. There were also sent over this aerial tramway of mill timbers, 26,500; coal, 4,250,150 pounds; merchandise, 21,276,155 pounds. The ore tonnage mentioned, if packed down, would alone have cost $250,000. The saving effected is apparent.

The ore has been concentrated on the basis of eight tons into one. The concentrate product for the past year has averaged twenty tons daily.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent.

Office, No. 330 Market Street, San Francisco, Cal.
Telephone Number, Davis 771.

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All Other Countries in the Postal Union..... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.....General Manager

San Francisco, March 12, 1898.

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IT is of interest to note that during the Golden Jubilee celebration, viz: from Jan. 24 to March 5, '98, 342 subscriptions were added to the MINING AND SCIENTIFIC PRESS lists. Such constantly recurring facts are among the reasons why those who want wide announcement advertise in this paper. They know that nowhere else can they get such publicity. It is not the comparative cost but the result of advertising that determines its value to the advertiser.

VIRGINIA CITY, NEVADA, is the one mining camp where one commodity—labor—still commands the same price it did a generation ago. Everything else—machinery, supplies, provisions, clothing, mining accessories of all kinds—are to-day procurable there at a reduction of from 40 to 50 per cent, but, as in the old bonanza days, the old Nevada scale of wages still obtains. One of the principal reasons for this is that the companies paying that scale are not dependent on private ownership, the purchasers of stock ordinarily caring little for any detail of mine work.

A CALIFORNIA CONGRESSMAN this week introduced a bill directing the President to appoint a commission of three residents of California to examine all lands patented by railroad companies in this State since January 1, 1893, where such lands appear to have been worked as mineral lands prior to the date of the patent, or where valuable deposits are supposed to exist. The bill provides that where the commission finds land contains minerals it shall report the fact in writing to the Secretary of the Interior, and if it appears to him that the lands should not have been patented to the railroad company, because of the mineral character, it shall be the duty of the Secretary of the Interior to call the attention of the Attorney-General thereto, and if the title of said lands has not been transferred by the railroad company to innocent purchasers for valuable consideration, it shall be the duty of the Attorney-General to commence suit to set aside and vacate such patents. The sum of $10,000 is appropriated for making the examination.

MANY MISTAKES are made in the purchase of mining machinery, the chief cause lying in the fact that the purchasing parties are too eager to get the machinery on the ground before they have demonstrated what they can count on for an output, or by the purchase of machinery which is not required on the property and will not do the work required of it. As a rule, the fault lies with the purchaser. The first thing to know is what the mine contains. Tests of the ore should be carefully made at various stages of the property's development, all of which should be carefully noted and recorded. Not only should the value of the ore and all its contents be ascertained, but in every instance the owner should know in what form the mineral occurs. After this has been done, and a sufficient amount of ore is taken out and exposed to justify the purchase of machinery, unless the owner is well informed himself or has a practical man of experience with him, he could do no better than to go to a responsible mining machinery manufacturer and lay all the facts before him, when, in the majority of cases, he would get the proper machinery and be able to successfully work his mine. Milling, concentrating, smelting and refining are each adjuncts of mining, and yet few ordinary mine owners are sufficiently acquainted with these adjuncts any more than a millman who has spent many years in that business is a first-class mining operator. But the manufacturer of mining machinery has a varied experience in his business. He is called upon to put machinery into all kinds of mines, and the safest way to do, unless one is oneself a practical millman, is to enlist his attention and avail oneself of his experience. In that manner one may often turn a worthless enterprise into a profitable investment. But the first rule is to know that one needs machinery and that the property will justify or demand its erection.

An Enterprise of Unusual Magnitude.

The Western Australian government has in contemplation a very large hydraulic enterprise, which is of interest to California and San Francisco. It is so important a project, involving the expenditure of so much money, that it occasions considerable preliminary discussion. The fact that California has developed and brought to a high degree of perfection the transmission of water, makes the subject one of local interest, Indeed, it is not impossible that proper representation and industrious effort would bring this entire contract to California.

As is well known to all readers of this paper, the Coolgardie gold region in Western Australia is one of considerable richness and extent. Lack of water retards its development. The rainfall is less than 5 inches, and water of inferior quality is sold at from 5 to 10 cents per gallon where produced. Recently the Premier of the Western Australia Assembly testified that on one occasion it cost him $5 to water five horses. Men operating mines have been obliged to carry salt water several miles for use in crushing rock. The Western Australian government proposes to supply this section of gold-mining country with 5,000,000 gallons of water per day. The plant involves the building of a pipe line 328 miles long from the Darling hills near the coast, where there is a good rainfall and where sites for reservoirs can easily be found. The intended source of supply is the Helena river, 320 feet above the sea, where a concrete dam 100 feet in height and 650 feet upper surface length would be built with a rock foundation. There is a watershed drainage with an area of about 550 square miles; and the engineers figure that less than 4 per cent of the rainfall in that area, if impounded, would furnish the desired supply.

The proposed service reservoir at Coolgardie, 328 miles inland, would be 1650 feet above sea level, or 1330 feet above the supply reservoir on the coast. The proposition is to connect these two reservoirs by 328 miles of 30-inch steel pipe. On this line would be nine pumping stations. It is contemplated that the pumping engines and necessary buildings would cost $1,000,000; that there would be 90,000 tons of 30-inch pipe, which would cost $3,350,000; transportation of that pipe from Freemantle, $700,000; laying and joining the pipe, $1,100,000; reservoirs, $1,500,000; one hundred miles of 12-inch distributing pipe, $850,000. It is estimated that the annual operating expenses would be about $1,600,000; and that on this basis the water at Coolgardie would cost 84 cents per thousand gallons, delivered.

The Legislature of Western Australia approves the project, and has authorized the issuing of bonds to the amount stated. A committee of experts in England was appointed to study the pumping machinery. This committee, composed of Messrs. Caruthers, Deacon and Unwin, reported that 5,000,000 daily, or 9.28 cubic feet per second, could be raised 1330 feet and carried 328 miles in a main 26 to 30 inches in diameter. They figured the total frictional resistance at 1222 feet, making a total head of about 2600 feet. For the 26-inch pipe the velocity in the main would be 2.513 feet per second; for the 28-inch pipe, 2.172 feet; for the 30-inch pipe, 1.888 feet. That for lap-welded pipe the frictional resistance would be respectively 5.103, 3.538 and 2.497; and that for riveted pipe the frictional resistance would be respectively 6.159, 4.270 and 3.103 feet; that it would require 2881 pump H. P.

Up to this point the engineers composing the committee appeared to be uniform in belief, and to have reached conclusions that are to be universally accepted. The material to be used in the piping, the manner of construction and accompanying details, are by no means matters of unanimity on the part of the committee; and as upon these very points depends the fate of the entire project, the question is one of interest to engineers of hydraulic construction everywhere.

The idea in general is to have the line of pipe follow the line of the Gold Fields railway, and it has been locally believed that the pipe could throughout its entire length be laid above the surface. The committee excluded the cost of iron pipe and paid some attention to steel spiral pipe imbedded in cement, which has had some favorable experience in Algeria. The committee recommends using mild steel with a tenacity of twenty-seven tons per square inch, and a minimum elongation of 16 per cent in 8 inches.

So many things in connection with this will naturally occur to the minds of those best fitted to pass expert judgment, that it is not to be wondered at that the committee hesitates to more than discuss or tentatively recommend. It is at this point that California hydraulic engineers and builders of the style of pipe evidently required, could, it is believed, be of benefit to the project and themselves.

The matter will be given considerable notice in technical journals on both sides of the Atlantic. In the *Engineering News* of the 17th ult. appears an editorial which intelligently discusses the proposition from the Atlantic standpoint. In that editorial it is said:

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The most important question which these engineers were asked to consider is the design of the pipe line, and their opinions make exceedingly interesting reading, to American engineers at least.

Cast iron pipe was excluded from consideration at the outset, as its cost would be so great as to make the scheme financially impracticable. In considering the best kind of pipe to adopt for the line, certain controlling conditions should be borne in mind. One is that the country across which the pipe line will extend is an arid region, and the soil is impregnated with salt, according to the engineers' report. Whether by this is meant sodium chloride or the ordinary alkaline salts usually present in the soil of arid regions, we do not know; but the latter is the more probable. In either case, however, any metal pipe is sure to be rapidly corroded unless it is protected at every point from contact with the soil. A second point to be considered is that the great length of the pipe line makes tightness an important matter. Slight leakage or evaporation from the surface of a porous pipe which would be too trivial for consideration upon a pipe line of ordinary length might amount to the loss of a considerable percentage of the total flow in a pipe line 328 miles long.

Turning now to the report of the Commission, we find, first, an investigation of a pipe made up of a steel spiral embedded in concrete. They seem to have spent considerable time investigating this pipe, but arrive at the conclusion that at present they cannot recommend it. From this distance one is unable to see why such a conduit should be seriously considered at all for such a place. It will be evident that the steel spiral must be the sole reliance for strength to sustain the pipe against internal bursting pressure, hence no considerable economy in the amount of steel will be possible compared with a line made up of steel plates. A more serious objection, however, is the very small longitudinal strength of the pipe. With the great temperature changes of the Australian climate, expansion and contraction would seem quite likely to cause cracks in the concrete, the repair of which would be difficult, to say the least.

Next the Commission takes up another patent pipe, which is an ingenious device for avoiding a longitudinal weld or riveted joint in a pipe made of steel plates. The edges of the plate to be joined are inserted in grooves in a specially rolled bar, and the joint is then rolled under pressure in such a manner that the bar is flattened, and a tight joint is, supposedly, made. There are two or three inventions of this class now being exploited in England. They may, perhaps, have merit for certain situations; but the only advantage it could offer over ordinary riveted pipe would be a possible small saving in cost. To employ any such untried invention on a work of such magnitude would be absurd. The Commission, in fact, confesses that until such pipes have been manufactured commercially and tested on a large scale they are unable to recommend their use, though they strongly intimate that they would like to do so.

After shelving, temporarily at least, these two inventions, the Commission very properly dismisses spiral riveted pipe, and then takes up the discussion of the use of welded or riveted pipes. In order that we may present the Commission's opinion fairly, we quote this portion in full:

Pipes with gas-welded longitudinal joints are undoubtedly the best. They are stronger for a given thickness than riveted pipes, and having a smooth surface, they present less interruption to the free flow of the water. But the immunity from possible leakage at joints is a still more important advantage. Per unit of length they are somewhat more expensive than riveted pipes, but being about 30 per cent stronger for equal diameter and thickness, it is actually cheaper to employ them wherever the necessary thickness of the riveted pipe is at least ¼ inch, below which thickness welded pipes become difficult to manufacture of the required diameters.

We therefore recommend that those pipes which will be subjected to the heavier pressures, and which therefore require a thickness of ¼ inch or more, should have two gas-welded longitudinal joints, and that they be made in tubes of about 14 feet length, coupled into pipes of about 28 feet, by inserting a plain end of one tube into a socket formed on the other tube, the transverse joint being riveted. Welded tubes can be manufactured of somewhat greater length, and it would be desirable that they should be as long as possible, because it would reduce the number of joints and possible points of leakage. We understand, however, that lengths greater than 28 feet would be inconvenient for carriage on the Western Australian railways.

The riveted pipes should be made with only one longitudinal joint, each "ring" or "tube" being therefore formed of a single plate. The greater part of the aqueduct will consist of such pipes, 28 inches to 30 inches diameter and 3-16 inch thick, and the greatest lengths of the tubes of which such pipes are made up will be about 5 feet 6 inches. The longitudinal joints should be double-riveted lap joints, and those of contiguous lengths should not fall in one line. Each tube should be made of the maximum length that can be obtained from a single plate These tubes should be single riveted together into lengths convenient for transport. The question of the connection of these lengths will be dealt with in our final report. The tubes may be made of uniform diameter, butt-jointed, with single-riveted covering rings. This, however, involves two rows of rivets at each transverse joint, two circular joints to be calked which can be calked only at the outer edges, and special difficulty of calking and rendering water-tight where the ring covers the overlap of the longitudinal joints. As there are two other ways of making the transverse joints, either of which is less liable to these objections, we do not recommend butt joints. One of these ways is to expand one end of each tube, thus forming a socket to receive the plain end of the next tube, and to join the two by single riveting. The other plan is to construct the tubes alternately of larger and smaller diameter, the diameters differing by twice the plate thickness. Each larger tube will then overlap the smaller tubes at either end, and will be connected therewith by single riveting. Having regard to all the circumstances, we recommend that the riveted pipes should be constructed of tubes of alternately larger and smaller diameter. In coming to this conclusion we have, of course, considered the increased hydraulic resistance, which we are satisfied is unimportant.

The grounds upon which the above recommendations are based are by no means clear in every case, and some of them are still a puzzle to us. For example, pipe made up with "two gas-welded longitudinal joints" is not a well known product on this side of the Atlantic. We can only conjecture that the Commission desires a thinner pipe than can be made in so large sizes by the ordinary lap-welding process, and they have in mind some English process by which a welded joint is made by heating the edges of the plate to be joined. This process, the Commission says, however, is not applicable to pipes of such large diameter made of plates less than ¼-inch thickness. Hence for the principal part of the conduit they recommend a riveted pipe of 3-16-inch plates.

One is next puzzled to know why they limit the distance between circumferential joints to 5 feet 6 inches. At first sight the simplest and cheapest way to make such a pipe would seem to be to take an 8-foot wide plate, bend it into a tube, and rivet up the longitudinal joint. But there are two difficulties to be met. The first is that rolling such thin plates in such widths is quite difficult, and when attempted the spring of the rolls is apt to make the plate considerably thicker in the middle than on the edges. The second is that the size of the fixed stake of the riveting machine limits the length in which riveted pipes of such small diameter can be made. We presume the Commission have based their recommendations on what English rolling mills and riveting machinery can do. Possibly American manufacturers can do better; if so, they should not fail to make their ability to do so known.

It should be said, however, that the saving in frictional resistance by cutting down the number of circumferential seams will not be so great as might at first sight be supposed. It will be seen by those who carefully study the Commission's recommendations that they have adopted an exceedingly large size of pipe for the volume of water they propose to deliver. The velocity of the water flowing in the pipe will be only about 1 3-5 feet per second, and this reduces the friction head so much that the difference between riveted pipe and smooth pipe is no great amount. We assume that the Commission determined by careful compilations that the extra cost of the larger pipe was warranted by the saving in pumping expenses due to the decreased hydraulic resistance.

The Commission describes with much detail the method of treating the pipe to protect it from corrosion, a very proper precaution, considering the thinness of the pipe and the alkali deserts through which it is laid. We believe, however, that they might learn some valuable lessons by studying American experience in this field, which has been far more extended than experience in all the rest of the world combined, if we mistake not.

Notwithstanding the elaborate precautions which are proposed against corrosion, the Commission recommends that the pipe should be laid upon the surface of the ground, and this is, perhaps, the most surprising statement in the whole report. We know of no instance where a continuous riveted pipe of considerable length is exposed to any such extremes of temperature as would exist in the case of the Coolgardie line. We are informed that computations show a strain in metal between the rivet holes in circumferential seams of riveted pipes equal to about 16,000 pounds per square inch from a change in temperature of 50°. That a much greater variation in temperature than this would occur in a pipe exposed to the sun on the arid plains of West Australia is beyond question, and that such strains must invariably cause loosening and leakage at the riveted joints seems almost equally sure. The water cannot be relied upon to equalize the temperature, for the very great distance between pumping stations will cause the water to be heated or cooled to the temperature of the pipe itself, whatever that may be, in the course of its journey, provided the latter is exposed on the surface of the ground as is proposed.

Space forbids us to criticise further the recommendations of this report in detail; but enough has been said, we believe, to make clear the fact that it would be much to the advantage of the Colony to either employ American engineers to advise it regarding its great enterprise, or else insist that its English advisers shall thoroughly study American practice in the construction of long pipe lines.

Nothing is said whatever in the report concerning the use of wood stave pipe; very likely the eminent English engineers had never heard of its use in this country. We cannot pretend to say, of course, that such pipe would be the best for the Coolgardie line; but its extended and successful use here under conditions in many respects quite similar to those which exist in Australia makes it entirely certain that no investigation can claim to be complete that does not examine into the merits of this class of pipe.

As to its durability, it seems safe to say that it would be at least as durable as a 3-16-inch steel pipe laid on salt or alkali soil. Wood stave pipes which have been in use for nearly thirty years in this country are still in good condition. The smooth interior surface of wood pipe results in less hydraulic friction than in any kind of iron pipe. Wood stave pipe could be built either of the native Australian woods or from the redwood of the Pacific coast, which could be delivered at Australian ports at a much smaller freight cost than

would be charged on iron pipe. It could be built with native labor, and the cost of contractors' plant would be trifling compared with the cost of a plant for riveting-up steel pipe, dipping it, and relaying it.

It would probably be inadvisable to use wood pipe for the parts of the line subjected to heaviest pressure; the American practice, as our readers well know, is to use steel pipe where the head is over 100 feet or so. The Coolgardie pipe line, as planned, however, consists of a series of steep lifts at each pumping station, followed by a long down grade to the next pumping station, and an examination of the profile in our last issue will show that three-fourths or more of the line is under no pressure which would interfere with the use of wood pipe. The saving in cost which would result from the substitution of wood stave pipe for three-quarters of the line we shall not attempt to estimate; but we believe it is well worth looking into.

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Our latest information is that the West Australian government has not yet been able to float the large bond issue, which it offered to raise funds for this work, at the rate of interest which the Colony was willing to pay; and matters are consequently at a standstill. Under these circumstances, the Colonial officers, if they desire to carry out their great enterprise, would do well to turn toward this country for aid. It is by no means impossible that they can obtain plans and advice here which will enable them to carry out their scheme at a saving of millions of dollars compared with the p ans proposed by the English engineers, and at the same time to utilize in the work to a large extent their own home labor and materials.

Regarding the above, it is evident that the country across which the pipe line will extend is somewhat similar to portions of southwestern California and southeastern Nevada, and that the "salt" mentioned in the engineers' report is intended to apply to the alkali character of the soil. The criticism and conclusions of our contemporary are in the main to be agreed with and confirmed. It is mistaken in assuming that any Australian native wood could be used. There is no Australian timber that would be found equal to the requirements of such a line. The only wood that could be successfully used is the California redwood. So far as our observation goes in regard to the report of the commission of English engineers, there is much that will be inexplicable to engineers on this coast, especially in respect to plate or riveted pipes. The proposition laid down, and especially the remarks upon constructive features, are open to an inference that the members of the Commission have had no experience in this branch of work, one that is familiar to the Pacific coast.

The Coolgardie line consists of abrupt elevation of the water, in stages, along the line and then a flow through long reaches at a velocity of less than 1.5 feet per second with but little pressure. This points to a wide divergence in conditions not fully recognized in the present report and permitting, if not demanding, at least two kinds of pipe. A metallic pipe whose weight was based on the hydraulic requirements would soon be destroyed by the corrosive action of the alkaline earth; a pipe of California redwood will come nearest meeting the requirements and be cheapest to construct and place. This wood is insured a life of twenty years at least. It is the belief of such men as Mr. Jno. Richards of this city that the fact that as experience in such work as that at Coolgardie has been confined mainly to this coast, our local engineers and contractors could undoubtedly carry out the work in a better and cheaper manner than can be done by European contractors.

That the enterprise will be pushed is evident, and it is believed that the material required, and the skill, experience and financial resources necessary to bring the work to a successful completion could be supplied in this city. The entire matter is worthy of local attention.

In the new *Examiner* building, Third and Market streets, San Francisco, is exhibited a new departure in architectural construction in this city in the use of terra cotta. Those potsherds outlast Time itself. Burned clay is the most indestructible material known to man. Fire cannot harm it nor water cause it to decay; nor frost nor sun nor the passing seasons of endless ages so much as soil its immutable surface. The oldest monuments of human handiwork in existence are prehistoric bits of baked clay and remnants of pottery, and the most ancient of human records are the tile tablets found in the buried cities of the Orient. These imperishable memorials are virtually terra cotta. This substance, formed into architectural ornaments, is found in the ruins of forgotten capitals bearing the stamp of the artist, the artisan, and the scribe who perished uncounted centuries ago. Terra cotta is known to the architects as well as to the archæologists as the most durable of materials known by man, and yet in the current world of the modern builder it has until the last few years, and especially in this country, been used only to a limited extent. In our constructive work it is still regarded somewhat in an experimental light—an experiment having the sanction of the ancients, it is true, but yet with us and for our untried purposes involving possible results not set down in the school manuals.

Out of ten people met on the streets of San Francisco probably seven have in their pockets letters from Klondikers. Every newspaper published in any part of the nation has a letter from some late resident who has at least got as far as Dyea or Skaguay. Never in the history of mankind was a hegira so thoroughly written up, and 99 of every 100 who write tell the truth. All who start realize that of a thousand men but one has any possibility of success; but each one confidently hopes that he will be the lucky one. It is pitiful to contemplate the certainty of unavailing peril and misery that will be the inevitable lot of the adventurers now flocking into that dreary region.

There is a nobility about the occupation of a miner which attaches to few if any other callings. In other business a dollar made is a dollar won or snatched from the pocket of a fellow competitor in the same line of business; but a dollar made by the miner makes the whole world that much richer, as it is taken from no man's pocket, but comes in its native state from mother earth. It is a dollar which has no associations of crime, want or misery to be ashamed of, and, unlike other productions, is not consumed or destroyed, but is a permanent contribution to the wealth of the community.

United States Mining Laws, and Regulations Thereunder, Relative to the Reservation, Exploration, Location, Possession, Purchase and Patenting of the Mineral Lands in the Public Domain.

NUMBER IV.

78. There should likewise be filed a certificate, under seal of the court having jurisdiction of mining cases within the judicial district embracing the claim, that no suit or action of any character whatever involving the right of possession to any portion of the claim applied for is pending, and that there has been no litigation before said court affecting the title to said claim, or any part thereof, for a period equal to the time fixed by the statute of limitations for mining claims in the State or Territory as aforesaid, other than that which has been finally decided in favor of the claimant.

79. The claimant should support his narrative of facts relative to his possession, occupancy, and improvements by corroborative testimony of any disinterested person or persons of credibility who may be cognizant of the facts in the case and are capable of testifying understandingly in the premises.

ADVERSE CLAIMS.

Sec. 2326, R. S. Where an adverse claim is filed during the period of publication, it shall be upon oath of the person or persons making the same, and shall show the nature, boundaries, and extent of such adverse claim, and all proceedings, except the publication of notice and making and filing of the affidavit thereof, shall be stayed until the controversy shall have been settled or decided by a court of competent jurisdiction, or the adverse claim waived. It shall be the duty of the adverse claimant, within thirty days after filing his claim, to commence proceedings in a court of competent jurisdiction, to determine the question of the right of possession, and prosecute the same with reasonable diligence to final judgment; and a failure so to do shall be a waiver of his adverse claim. After such judgment shall have been rendered, the party entitled to the possession of the claim, or any portion thereof, may, without giving further notice, file a certified copy of the judgment roll with the register of the land office, together with the certificate of the surveyor-general that the requisite amount of labor has been expended or improvements made thereon, and the description required in other cases, and shall pay to the receiver five dollars per acre for his claim, together with the proper fees, whereupon the whole proceedings and the judgment roll shall be certified by the register to the Commissioner of the General Land Office, and a patent shall issue thereon for the claim, or such portion thereof as the applicant shall appear, from the decision of the court, to rightly possess. If it appears from the decision of the court that several parties are entitled to separate and different portions of the claim, each party may pay for his portion of the claim with the proper fees, and file the certificate and description by the surveyor-general, whereupon the register shall certify the proceedings and judgment roll to the Commissioner of the General Land Office, as in the preceding case, and patents shall issue to the several parties according to their respective rights. Nothing herein contained shall be construed to prevent the alienation of a title conveyed by a patent for a mining claim to any person whatever.

Be it enacted in the Senate and House of Representatives of the United States of America in Congress assembled, That if, in any action brought pursuant to section twenty-three hundred and twenty-six of the Revised Statutes, title to the ground in controversy shall not be established by either party, the jury shall so find, and judgment shall be entered according to the verdict. In such case costs shall not be allowed to either party, and the claimant shall not proceed in the land office or be entitled to a patent for the ground in controversy until he shall have perfected his title.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the adverse claim required by section twenty-three hundred and twenty-six of the Revised Statutes may be verified by the oath of any duly authorized agent or attorney in fact of the adverse claimant cognizant of the facts stated; and the adverse claimant, if residing at the time being beyond the limits of the district wherein the claim is situated, may make oath to the adverse claim before the clerk of any court of record of the United States or the State or Territory where the adverse claimant may then be, or before any notary public of such State or Territory.

80. An adverse mining claim must be filed with the register and receiver of the land office where the application for patent was filed, or with the register and receiver of the district in which the claim is situated at the time of filing the adverse claim. It must be on the oath of the adverse claimant, or it may be verified by the oath of any duly authorized agent or attorney in fact of the adverse claimant cognizant of the facts stated.

81. Where an agent or attorney in fact verifies the adverse claim, he must distinctly swear that he is such agent or attorney, and accompany his affidavit by proof thereof.

82. The agent or attorney in fact must make the affidavit in verification of the adverse claim within the land district where the claim is situated.

83. The adverse notice must fully set forth the nature and extent of the interference or conflict; whether the adverse party claims as a purchaser for valuable consideration or as a locator; if the former, a certified copy of the original location, the original conveyance, a duly certified copy thereof, or an abstract of title from the office of the proper recorder should be furnished, or if the transaction was a merely verbal one he will narrate the circumstances attending the purchase, the date thereof, and the amount paid, which facts should be supported by the affidavit of one or more witnesses, if any were present at the time, and if he claims as a locator he must file a duly certified copy of the location from the office of the proper recorder.

84. In order that the "*boundaries*" and "*extent*" of the claim may be shown, it will be incumbent upon the adverse claimant to file a plat showing his entire claim, its relative situation or position with the one against which he claims, and the extent of the conflict. This plat must be made from an actual survey by a United States deputy surveyor, who will officially certify thereon to its correctness; and in addition there must be attached to such plat of survey a certificate or sworn statement by the surveyor as to the approximate value of the labor performed or improvements made upon the claim by the adverse party or his predecessors in interest, and the plat must indicate the position of any shafts, tunnels, or other improvements, if any such exist, upon the claim of the party opposing the application, and by which party said improvements were made: *Provided, however*, That if the application for patent describes the claim by legal subdivisions, the adverse claimant, if also claiming by legal subdivisions, may describe his adverse claim in the same manner without further survey or plat.

85. Upon the foregoing being filed within the sixty days' publication, the register, or in his absence the receiver, will give notice in writing to *both parties* to the contest that such adverse claim has been filed, informing them that the party who filed the adverse claim will be required within thirty days from the date of such filing to commence proceedings in a court of competent jurisdiction to determine the question of right of possession, and to prosecute the same with reasonable diligence to final judgment, and that, if such adverse claimant fail to do so, his adverse claim will be considered waived, and the application for patent be allowed to proceed upon its merits.

86. When an adverse claim is filed as aforesaid, the register or receiver will indorse upon the same the precise date of filing, and preserve a record of the date of notifications issued thereon; and thereafter all proceedings on the application for patent will be suspended, with the exception of the completion of the publication and posting of notices and plat, and the filing of the necessary proof thereof, until the controversy shall have been adjudicated in court, or the adverse claim waived or withdrawn.

87. Where an adverse claim has been filed and suit thereon commenced within the statutory period, and final judgment determining the right of possession rendered in favor of the applicant, it will not be sufficient for him to file with the register a certificate of the clerk of the court, setting forth the facts as to such judgment, but he must, before he is allowed to make entry, file a certified copy of the judgment, together with the other evidence required by section 2326, Revised Statutes.

88. Where such suit has been dismissed, a certificate of the clerk of the court to that effect or a certified copy of the order of dismissal will be sufficient.

89. After an adverse claim has been filed and suit commenced, a relinquishment or other evidence of abandonment will not be accepted, but the case must be terminated and proof thereof furnished as required by the last two paragraphs.

90. When an adverse claim has been filed, but no suit commenced against the applicant for patent within the statutory period, a certificate to that effect by the clerk of the State court having jurisdiction in the case, and also by the clerk of the circuit court of the United States for the district in which the claim is situated, will be required.

VERIFICATION OF AFFIDAVITS IN RELATION TO MINERAL ENTRIES.

Sec. 2335, R. S. All affidavits required to be made under this chapter may be verified before any officer authorized to administer oaths within the land district where the claims may be situated, and all testimony and proofs may be taken before any such officer, and, when duly certified by the officer taking the same, shall have the same force and effect as if taken before the register and receiver of the land office. In cases of contest as to the mineral or agricultural character of land, the testimony and proofs may be taken as herein provided on personal notice of at least ten days to the opposing party; or if such party cannot be found, then by publication at least once a week for thirty days in a newspaper, to be designated by the register of the land office as published nearest to the location of such land; and the register shall require proof that such notice has been given.

Sec. 2. That applicants for mineral patents, if residing beyond the limits of the district wherein the claim is situated, may make any oath or affidavit required for proof of citizenship before the clerk of any court of record, or before any notary public of any State or Territory.

(See Adverse Claims.)

GENERAL LEGISLATION.

Sec. 2338, R. S. As a condition of sale, in the absence of necessary legislation by Congress, the local legislature of any State or Territory may provide rules for working mines, involving easements, drainage, and other necessary means to their complete development; and those conditions shall be fully expressed in the patent.

Sec. 2339. Whenever, by priority of possession, rights to the use of water for mining, agricultural, manufacturing, or other purposes, have vested and accrued, and the same are recognized and acknowledged by the local customs, laws, and the decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same; and the right of way for the construction of ditches and canals for the purposes herein specified is acknowledged and confirmed; but whenever any person, in the construction of any ditch or canal, injures or damages the possession of any settler on the public domain, the party committing such injury or damage shall be liable to the party injured for such injury or damage.

Sec. 2340. All patents granted, or preemption or homesteads allowed, shall be subject to any vested and accrued water rights, or rights to ditches and reservoirs used in connection with such water rights, as may have been acquired under or recognized by the preceding section.

Sec. 2341. Wherever, upon the lands heretofore designated as mineral lands, which have been excluded from survey and sale, there have been homesteads made by citizens of the United States, or persons who have declared their intention to become citizens, which homesteads have been made, improved, and used for agricultural purposes, and upon which there have been no valuable mines of gold, silver, cinnabar, or copper discovered, and which are properly agricultural lands, the settlers or owners of such home teads shall have a right of preemption thereto, and shall be entitled to purchase the same at the price of one dollar and twenty-five cents per acre, and in quantity not to exceed one hundred and sixty acres; or they may avail themselves of the provisions of chapter five of this title, relating to "Homesteads."

Sec. 2342. Upon the survey of the lands described in the preceding section, the Secretary of the Interior may designate and set apart such portions of the same as are clearly agricultural lands, which lands shall thereafter be subject to preemption and sale as other public lands, and be subject to all the laws and regulations applicable to the same.

Sec. 2343. The President is authorized to establish additional land districts, and to appoint the necessary officers under existing laws, wherever he may deem the same necessary for the public convenience in executing the provisions of this chapter.

Sec. 2344. Nothing contained in this chapter shall be construed to impair in any way, rights or interests in mining property acquired under existing laws; nor to affect the provisions of the act entitled "An act granting to A. Sutro the right of way and other privileges to aid in the construction of a draining and exploring tunnel to the Comstock lode, in the State of Nevada," approved July twenty-five, eighteen hundred and sixty-six.

Sec. 2345. The provisions of the preceding sections of this chapter shall not apply to the mineral lands situated in the States of Michigan, Wisconsin and Minnesota, which are declared free and open to exploration and purchase, according to legal subdivisions, in like manner as before the tenth of May, eighteen hundred and seventy-two. And any bona fide entries of such lands within the States named since the tenth of May, eighteen hundred and seventy-two, may be patented without reference to any of the foregoing provisions of this chapter. Such lands shall be offered for public sale in the same manner, at the same minimum price, and under the same rights of preemption as other public lands.

Sec. 2346. No act passed at the first session of the Twenty-eighth Congress, granting lands to States or corporations to aid in the construction of roads or for other purposes, or to extend the time of grants made prior to the thirtieth day of January, eighteen hundred and sixty-five, shall be construed as to embrace mineral lands, which in all cases are reserved exclusively to the United States, unless otherwise specially provided in the act or acts making the grant.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That within the States of Missouri and Kansas deposits of coal, iron, lead, or other mineral be, and they are hereby, excluded from the operation of the act entitled "An act to promote the development of the mining resources of the United States," approved May tenth, eighteen hundred and seventy-two, and all lands in said States shall be subject to disposal as agricultural lands.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all citizens of the United States and other persons, bona fide residents of the State of Colorado, or Nevada, or either of the Territories of New Mexico, Arizona, Utah, Wyoming, Dakota, Idaho, or Montana, and all other mineral districts of the United States, shall be, and are hereby, authorized and permitted to fell and remove, for building, agricultural, mining, or other domestic purposes, any timber or other trees growing or being on the public lands, said lands being mineral, and not subject to entry under existing laws of the United States, except for mineral entry, in either of said States, Territories, or districts of which such citizens or persons may be at the time bona fide residents, subject to such rules and regulations as the Secretary of the Interior may prescribe for the protection of the timber and of the undergrowth growing upon such lands, and for other purposes: *Provided*, That the provisions of this act shall not extend to railroad corporations.

Sec. 2. That it shall be the duty of the register and the receiver of any local land office in whose district any mineral land may be situated to ascertain from time to time whether any timber is being cut or used upon any such lands, except for the purposes authorized by this act, within their respective land districts; and, if so, they shall immediately notify the Commissioner of the General Land Office of that fact; and all necessary expenses incurred in making such proper examinations shall be paid and allowed such register and receiver in making up their next quarterly accounts.

Sec. 3 Any person or persons who shall violate the provisions of this act, or any rules and regulations in pursuance thereof made by the Secretary of the Interior, shall be deemed guilty of a misdemeanor, and, upon conviction, shall be fined in any sum not exceeding five hundred dollars and to which may be added imprisonment for any term not exceeding six months.

(*To be Continued.*)

The Gold-Silver Mines in Kapnik, Hungary.

Written for the MINING AND SCIENTIFIC PRESS by R. HELMHACKER, Prague.

The mountains on the boundary between Upper Hungary and the northern Transsylvania, in the district (comitate) Satmar (written Szatmar), a by-range of the Veehorlat-Goutin range, are termed also the Northern Transsylvanian Ore mountains, on account of their gold-silver-copper-lead deposits, mined in Nadibania (Nagybanya), Felshebania (Felsobanya), Kapnik — all close to the Transsylvania boundary—as well as in Olahlaposhbania and several other smaller mines worked in Transsylvania. The range consists chiefly of young eruptive rocks, as andesites (propylite), trachyte intruding through older crystalline strata and through strata of sandstone and slatey clay of the Cretaceous and Tertiary series. Their intrusions fall about the time somewhat before and during the Tertiary-Neogæan division. The andesite forms the older of the youug eruptive rocks in Hungary and Transsylvania, piercing to the earth's surface at the beginning of the formation of the lower mediterranean strata—to which may be counted also the uppermost Oligocene-Aquitanian group—to the end of the sedimentation of the Sarmatic-Miocene group. The andesite being not accompanied with extensive stratified layers of tufas, it is supposed that it reached the dry land, while the trachyte (the true trachyte, rhyolite, quartz-trachyte), according to most of the recorded observations, penetrating the andesite, and therefore younger, with its accompanying trachytic tufas, breccias and conglomerates appears to be of submarine origin.

The andesite is a porphyritically developed mixture of plagioclase (oligoclase) and amphibole, with accessory augite, sometimes also with biotite, with quartz or void of it. The andesite without quartz is termed properly "andesite," while the quartz containing rock is the "dacite," which, inclining mostly to decomposition, is termed "propylite," occurring generally in more subordinated masses. The propylites of greenish colors, designed in the earlier times as greenstone, trachytes or greenstone porphyries, pass in the way of decomposition through a brownish variety or a disintegrated rock with brown strings to a half or fully decayed, soft, greyish or greyish-white rock.

The trachyte is made out with orthoclase (sanidine) in connection with oligoclase, amphibole and biotite, without or with visible quartz (rhyolite).

All these varieties of eruptive rock were found together, but the propylite is always subordinate in its bulk. The mines are located in the well-characterized green propylite in its beginning state of decomposition, as well as in the totally decayed varieties, all so distinct from the trachytes and other andesites. The metallic veins are principally recognized in this rock, which therefore may be also termed as the ore-carrying rock, while mineral veins with ores pierce only seldom other trachytes or stratified rock coming into contact with the proper propylite. These features are closely similar to the conditions of ore-bearing observed in the Rocky mountains in the United States.

In the region of the propylite trend in the Northern Transsylvania Ore mountains are situated the mines above alluded to, from W. to E. forming the Nadibania mining district, with the seat of administration in Nadibania itself.

The village Kapnik, also Kapnikbania, 20 km. east from Felshebania, is situated at the altitude of 800 m. in a gulch-like dale sloping down from the Goutin mountain, 1447 m. high; the brook in the dale forms the Hungaro-Transsylvanian frontier. In the village itself are seen outcrops of green propylite and grey trachyte dikes connected with contact and friction breccias and conglomerates of them, all penetrated again with dikes of grey trachyte of posterior formation. The young Miocene strata with congeria fossils deposited in the vicinity of this place, witness the not remote age of the trachytes connected with them. The two distinct systems of metallic veins recognized here are bound to the propylite rock. The first group of fissure veins trending from E. to W. comprises the thick metallic veins near the junction of propylite with the younger trachyte and its contact breccias, the second system of thin fissures forming at present metallic veins; extending from NE. to SW. is the younger one, sometimes displacing veins above mentioned by faults. According to the observations, dikes and contacts of trachyte with the older propylite are not recognizable in the vicinity of the veins of the second system.

Both of the vein groups are characterized distinctly. The veins in the older system are like to the veins in Felshebania, in case they are poor in quartz. They form friction conglomerates or rather breccias filled with decayed rubbish of volcanic rock and clay, cemented together either with a rock of trituration or with metallic ores and minerals, from which quartz constitutes the large part. In case the quartz is wanting in the vein breccia, which rarely takes place, the metallic ores are attached immediately on the decomposed friction fragments or between them. Only thus, and by no means in another manner, the realgar occurs in these thick fissure veins. But more frequently the ores form vein-like strings traversing the cemented disintegrated fragments in the breccia veins, but most of the ores occur on such places where the veinstone is throughout impregnated with quartz or hornstone.

The second system of veins trending to 2 h. or 3 h. —that is NE.—is the principal object of the mining industry in Kapnik. The vein system is made out of 14 veins, with its strings nearly parallel to each other, ½ to 3 m. thick. In average, the distance of one vein from the other is about 220 m., though some of them are distant from each other only 80 to 150 m. Their dip, though, to one or the other side is great, approaching to a right angle, mostly to SE. with 60°–80°, and in some cases even vertically. As the veins trend all nearly parallel, they are developed by a main deep adit 2000 m. (Ferdinandi adit) long crosscutting them. The older adit, about 100 m. higher, is longer, about 6000 m. Some of these veins, though only eight of them are workable, known to 1000 m. in their length, are developed in the direction of their strike to more than 800 m.; but in NE. direction they are generally not so promising, and assay low.

In all the veins, without exception, tetrahedrite is occurring; but other five veins bear generally auriferous and lead ores; in three of the veins lead ores and gold are only subordinated; in four veins the tenor of gold is better, but their yield in lead only weak. Generally the veins with prevalent tetrahedrite assay lower in gold, those with lead ores higher in gold. The quartz is a conspicuous ingredient of the gangue; also hornstone with thin impregnation of auriferous pyrite, and beside this with thin rents or ledges from 2 mm. to 1 m. thick, filled with ores. Though the thin ore strings pierce only the quartz forming the brood of the vein, they sometimes furcate in the side walls also impregnated with quartz. The quartz percolations of the country rock become more and more scarce with increasing distance in the adjacent rock from the vein, till the decomposed propylite appears without any charge of impregnating silica.

As fissure veins the mineral deposits frequently exhibit a banded structure in the materials which form them, which feature is produced by the deposition on their walls of successive layers of different minerals. But as the fissures or rents in the vein already entirely or partly filled were formed consecutively, either enlarging and opening the old fissures or forming new ones, the new rents were filled with other minerals in the same way as the first, mostly with a new generation of quartz or amethysts in handsome crystals, also with hornstone or other ores, piercing the old veinstone. The minerals from this mining place are known for their handsome forms, and may be found in all the greater mineral collections.

The quartz constitutes a large part of the material composing the veins, then follows the hornstone and dialogite (manganese carbonate) as second in quantity; calcite and baryte are also common. The metallic minerals composing the value of the veins are auriferous pyrite in impregnations or in free developed crystals and chalkopyrite, both also in small strings or a network of strings in quartz, accompanied with galenite and sphalerite as two less frequent occurrences. Other ores are: tetrahedrite, argentite, Stephanite, Redruthite, polybasite, pyrargirite, native gold and silver. More seldom are amethyst, dolomite, gypsum, antimonite, realgar, native arsenic, and many others. Peculiar for the Kapnik veins is the pink-colored vein gangue by dialogite, or intimate mixtures of quartz with dialogite deposited at once, in which quartz-dialogitous mixture, forming, except the breccia-form inclusions of decomposed wall rock, almost the entire mass of the veinstone are imbedded grains of sphalerite, further nests of white quartz including galenite, also with tetrahedrite, Bournonite, both forming often crystals in drusy cavities.

The successive formation of minerals exhibited in the veinstones shows, beginning with the oldest formed, the series: (1) dialogite, then (2) hornstone, (3) quartz; after this, as the vein had been filled, it was again opened by rents and the newly formed fissures were formed with newer minerals from which is the oldest, (4) galenite and pyrite. Other veinstones exhibit the mineral succession: (1) quartz, (2) the seldom Nagyagite (pronounce nadiakit), (3) dialogite. Also: (1) dialogite, (2) quartz, (3) galenite, (4) sphalerite, (5) younger dialogite, (6) younger quartz. Another succession: (1) quartz, (2) dialogite, (3) quartz, (4) dialogite with included tetrahedrite. — (1) quartz, (2) dialogite with included galena and sphalerite, (3) quartz, (4) dialogite, (5) quartz, (6) dialogite.— (1) quartz, (2) dialogite with included Redruthite (chalkosite), (3) quartz, (4) dialogite, (5) quartz, (6) dialogite.— (1) quartz, (2) alabandine (Mn. S.), (3) brown sphalerite with pyrite, (4) dialogite, (5) sulphur.— (1) Nagyagite, (2) dialogite, (3) native arsenic, (4) sulphur.— (1) quartz, (2) sphalerite, (3) tetrahedrite with chalkopyrite, (4) quartz. — (1) quartz, (2) tetrahedrite, (3) honey-yellow sphalerite, (3) chalkopyrite, (5) quartz.— (1) quartz, (2) native arsenic, (3) realgar, (4) baryte.

The vein system with NE. direction is worked by the State itself in a claim of 2720 ha. Rail tracks below ground are 21 km.; hoisting engines, two with 17 H. P. The dressing of the cobbed ore is done in one battery of twelve stamps, two crushing rollers and two jiggers. The savings are pulverized in two jaw crushers and four crushing mills with 108 ordinary and 60 revolving stamps, in pointed trunks; 34 percussion planes of Rittinger, 6 common plane tables, all run with a Girard partial turbine of 108 H. P., and 11 water wheels of 68 H. P. In mining are engaged 9 officers, 324 miners and 28 boys. The average yearly production taken for the years 1890–95 was: 15,890 ts. cobbed ore, 1144 ts. savings, all giving 1262 ts. tailings with a yield of 18.8 kg. Au, 1619 kg. Ag, 10 ts. Cu, 130 ts. Pb, presenting a value of 177,000fl. The mining production differs from the smelting works' production, because the last reduce also auriferous pyrites from other mines.

The average yearly production of Kapnik in the space of time from 1857–96, during 40 years, was: Cobbed ore, were raised 14,095 ts.; savings, 600 ts., giving 1304 ts. tailings with the yield of 15.6 kg. Au, 1588 kg. Ag, 8 ts. Cu, 171 ts. Pb. The yearly returns were in average 197,910fl. raw income, the expenses 183,664fl., the net profit 14,246 fl.; but for the last years resulted a loss.

The system of thick veins going from W. to E. is developed only by one mine, operated by a private owner, in claims of 751 ha. with 2½ km. underground rail tracks. The savings are dressed on the walking floors with jigs and a French stamp work. The production by 5 officers and 178 miners reached 8400 ts. savings with a yield of 7 kg. Au, 2½ kg. Ag, and 725 ts. tailings, in the value of 39,000fl.

The State, as operator, reduces its own and other ores bought from private mines in the reduction works at Kapnik, giving work to 103 men and 9 boys. The ores yielding more than 10% in lead are smelted in blast furnaces, which process presents nothing particular.

The poor dressed lead ores from Kapnik were difficult to reduce on account of their formidable amount of sphalerite, wherefore the hot reduction process was substituted by an extraction process for utilizing such ores poor in lead, rich in sphalerite, and, as much as possible, low in gold; while the other ores, rich in Cu, Pb and precious metals were smelted as usual.

The new extraction process, since ten years in use, was successfully accomplished by Bichansky (Bittsanski); Kurovsky, the superintendent of the reduction work, and, following him, G. Kroupa, made communications of this process, solved in the Kapnik reduction work by the first.

The newly introduced leaching process, a combination of the Augustin and Patera methods, involves the following operations: The ore is roasted by chlorination, then leached with a solution of natrium-chloride; the residue from the first leaching is lixiviated a second time with sodium-calcium hyposulphite. The two solutions are treated separately; in the first or the natrium-chloride liquor the solved metals are precipitated by means of iron scrap; in the second or hyposulphite solution the metals are precipitated with a solution of calcium-natrium sulphuret immediately before prepared. In the first case the metals are precipitated in the metallic state; in the second, metal sulphurets were obtained. Both of the precipitates are smelted in furnaces.

To accomplish these processes of roasting and leaching, the following operations are to be performed: (a) The dressed ores destined to be utilized in the extraction plant are mixed and dried. (b) When dry they are sieved, (c) and mixed with (ground) common salt, (d) and effecting only a partial roasting by the heat of the sulphur contained in them when burning. (e) After this the partially chlorinated ores are again sieved. (f) The residue (baked ore) passing out through the meshes of the sieves is crushed and ground in mills. (g) The partially roasted mixture is reroasted and rechlorinated in reverberatory furnaces, (h) which is followed by two lixiviations, first, a solution of common salt and the leached residue with hyposulphite of natrium-calcium. (i) The precipitation of Au, Ag, Cu, Pb in the first leached portion by means of scrap iron, (j) and in the second hyposulphite solution by adding calcium-natrium sulphurets, and thus throwing down Au, Ag, Pb sulphurets. (k) The precipitated (cemented) metals with iron are washed and dried; (l) the sulphurets-bearing precipitate is taken off and dried. (m) At last, the fly-dust formed by converting the ores into chlorides by the roasting process, is gathered and leached out with hot water.

The leaching liquors are made separately. The salt liquor is made in solving common salt in a vat with warm water to the strength of 20° to 22° B. The natrium-calcium sulphuret is to be prepared immediately before performing the precipitating process, as the solution is able to decompose when exposed to the air by oxidation in a short time; therefore, to prevent this inconvenience, only such an amount is to be composed as sufficient for one sole precipitation. In boiling sodic hydrate and quicklime (calcic hydrate) with sulphur (flowers) and water in an iron kettle results the Na_2S+CaS_5 natrium sulphuret, calcium peuto sulphuret for: $2NaOH+Ca(OH)_2+S_{10}+H_2O=Na_2S+CaS_5+H_2S+SO_2+H_2O$. On exposure to the air the sulphurets oxidate in the

hyposulphite salt as: $Na_2S+CaS_5+H_2O+O_6=Na_2Ca(S_2O_3)_2+S_2+H_2O$.

The plant in the extraction mill, in several buildings on terraces placed one on a deeper level below the other, to treat 3000 ts. yearly, is as follows: There are 18 self-acting (self-heating) furnaces, in sets of 6 furnaces, each one with seven working compartments. The mixed ores, before roasted, are dried on boiler plates which cover the flue dust chambers. The ores destined to be treated by extraction, about 2000 ts. yearly, are to one-half silver ores and to the other half sulphureted tailings mixed in such a manner to contain sulphur, as much that 45% would result. The average yearly test of the mixed charges is: Pb=2.5%, Ag(+Au)=.057% (in 1 kg. Ag+Au are contained .006 kg. Au), Zn S=18%, Cu=3% and matte 45% (from pyrites). By testing the ores, amounts of Cu and Pb below ½% are neglected. To perform the chlorination, the ore charges are mixed with 16% salt; but the salt is added to them in intervals, as, 6% immediately, 6% on the fourth operating compartment; the remaining 2 and 2% are added later. The furnace charge with the first 6% salt admixture is made once in 50 minutes at 1 metric cwt., and every 50 minutes a charge of 1 cwt. is drawn from the furnace, giving thus 28 8 cwts. in a day for one group or 89.4 cwts. for the whole set, or, in a year with 300 working days, 2592 tons of partially chlorinated ore.

The partially chlorinated ore with two admixtures, a 6% of NaCl, is mixed with 2% Nall before charged in the two reverberatory furnaces, each of them with two working compartments, where it is heated during four hours. Immediately before it is discharged from the furnace, the last 2% Nall and 1% of manganese dioxide (MnO_2) are added. The quantity of the heated or completely roasted ore in 24 hours is 60 cwts., giving in a year 3600 ts.

In the burning house are 20 cooling holes (pits) with a capacity of 12 cub. m. for the hot charges, and beside this the furnaces are connected with a 176 m. long system of fly-dust chambers.

The last admixture of salt with MnO_2 shall accomplish the chlorination process as: $4NaCl+MnO_2+2SO_2+O_2$ give $NaSO_4+MnCl_4+Cl_2$, the chlorine which is disengaged and attacks the ore, perhaps not yet chlorinated. The presence of much combined Cu facilitates the chlorination process. The cost of the roasting-chlorination per 1 cwt. is 48 kreuzer; the cost of labor in the self-heating furnaces amounts to 26 kr. and for the heating in the reverberatory furnaces 22 kr. per 1 cwt. treated ore. The chlorinated charges contain: Ag Cl, Cu Cl, Cu_2 Cl, Zn Cl, Pb Cl, Fe_2 Cl_3, Na SO_4, Na Cl and insoluble oxides.

The roasted or chlorinated ore is leached with 20° to 22° B strong salt solution, in 20 leaching tanks with a capacity of 12½ cub. m. or a bottom of 245 sq. m., during 4 days, acting on charges of 3 ts. Monthly are leached 300 ts., yearly 3000 ts., chlorinated ores. The salt solution dissolves a great bulk, namely 76 to 68%, of the easily soluble chlorides, leaving a residue of .012 to .016 kg. Ag+Au in a burden of 1 cwt.

After this the lixiviation residue is releached during two days with natrium-calcium hyposulphite, solving the chlorides, more difficultly soluble in common salt, as: Agll, Au_2Cl_3, ZnCl, etc. For instance, Agll gives: $4NgCl+(3Na_2S_2O_3+3CaS_2O_3)=Ag_2Ca_2(S_2O_3)+Ag_2S_2O_3+2NaS_2O_3+Na\,ll+CaCl_2$; or, Au_2Cl_3 gives: $3Na_2S_2O_3+AuS_2O_3+(3CaS_2O_3+Au\,S_2O_3)+H_2O$. The final residue heaped on refuse dumps test in 1 cwt. .001—.002 kgAg+Au (in 1 kg Ag are contained .006 kgAu).

The basin for accumulating the salt solution has a capacity of 36 cu. m.; that for $Na_2Ca(S_2O_2)O_2$ is constructed in the earth from concrete with a capacity of 18 cu. m. The solutions of the two leaching liquors, the common salt and hyposulphite, are conveyed from distributing vats situated on the second floor of the building and raised from the accumulation basins by means of pumps, each extra for both of the two solutions.

To precipitate the metals from the solution of the metallic chlorides in salt the liquid is treated in thirty-three sets of 462 spherical precipitating basins made of earthenware ½ m. in diameter, ⅔ m. deep and 117-liter capacity, placed side by side and one below the other. The solution is circulating in 3 cm. lead pipes, reaching nearly to the bottom of each basin filled each with 160 kg. old scrap iron, and all total with seventy-four tons iron. The precipitation is further done in twelve precipitating tanks, each one 4 m. long, 40 cm. wide, all of them filled with 11.5 tons scrap iron. They have partition walls to convey the solution in a meandering way in them. The iron in both these appliances precipitates the metals, by which about 15% of the iron bulk is solved or consumed in a year. The silver chloride treated thus by precipitation is decomposed to: $2NaAgCl_2+Fe=FeCl_2+NaCl+Ag_2$.

The solution from the repeated treatment with $CaNa_2(S_2O_3)O_2$ is filled in sixty-five oak vats of cylindrical form 1 m. in diameter, 1⅔ m. deep and a bulk of 1 cu. m.; here to the solution is added a fresh supply of the sodium-calcium sulphuret solution kept ready in twelve vats. The settlement of the precipitate of metal sulphurets is done in two settling tanks. The chemical process thus performed, for instance, to free the silver solution from metal is: $Ag_2S_2O_3+Ag_2Ca(S_2O_3)+(Na_2S+CaS_5)=2Ag_2S+NaS_2O_3+3CaS_2O_3+S_4$.

It is seen that the hyposulphides are not to be formed as they are obtained as by-product by the decomposition of the sodium-calcium sulphurets. The precipitated (cemented) metals are removed in several weeks, the precipitated sulphurets every fortnight and dried afterwards.

The precipitating treatment gives an output of 18%, the sulphuret precipitation an amount of 1% on total 28%, exhibiting also a 36-times concentration of the metal bulk contained in the ore before the treatment by the leaching process. The composition of the precipitated metals is thus: 1 cwt. yields 2.265 kgAg+Au (in 1 kgAg+Au is the tenor of Au=.0013 kg) 18–20% Cu. and 15 to 16% Pb. The precipitated sulphurets yield in the average in 1 cwt.: 1.3 kgAg+Au (in 1 kgAg+Au is the Au tenor .010 to .012 kg) and 4–5% Pb.

Both of the products resulting from the treatment of poor lead ores, as the precipitated metals and sulphurets, are desilverized in adding them to the molten weakly argentiferous lead, when subject to the cupellation. The lead in the way of cupellation combines with 30% of the added precious metals, while 70% of them go in the copper, yielding skimmings of the lead. The argentiferous lead yields 1–2 kg. of auriferous silver per 1 cwt. and is cupelled. The skimmed cupriferous litharge (lead) is smelted in a blast furnace with other lead products or lead ores with quartz and iron to argentiferous lead with .4 to .5% Ag (+Au), by which reduction process is obtained a matte yielding 25 to 30% Cu., 8 to 10% Pb. and .08 to .10% auriferous silver.

At last the flue dust collected in quantities amounting to about 3% of the ore treated in the chlorination furnaces is recovered. The dust yields: Agll, AgO, $AgSO_4$, Au_2Cl_3, AuCl, Au; CuCl, Cu_2Cl, CuO, $CuSO_4$; PbCl, PbO, $PbSO_4$; ZnCl, ZnO, $ZnSO_4$, and is leached out with boiling water, and the solution precipitated with iron. The precipitate yields in 1 cwt. .1 to .11 kgAg (with Au), 15–20% Cu, 10–12% Pb. The leaching remainder contains .07–.075% Ag (+Au; Au=.04), 15–16% Pb., and is reduced on the dry way in the melting rock.

The cost of extracting the ores is per ton 9.22fl.; the total cost of extracting and smelting one ton, inclusive the cupellation, inclusive the lead reducing, but less the administration expenses, is 11.6fl. The cost of the plant for treating 3000 ts. poor ores is 82,000fl., namely for self-heating furnaces 11,000fl., for reverberatory furnaces 4000fl., cooling pits 2200fl., for the leaching plant 60,000fl., and for other work done 5000fl. The net profits of the extraction work in the year 1894 amounted to 7940fl.

In the year 1894 were treated in the extraction work: (1) Argentiferous ores 734.8 ts. with auriferous silver=463.8 kg. (Ag=465.1 kg, Au=1.3 kg.) and with copper and lead in quantities below ½% and therefore not tested. (2) Tailings containing sulphur (pyrites) 684.3 ts. with 399.1 kg. auriferous silver (395.8 kg. Ag, 3.2 kg. Au), 3 8 ts. copper and lead below ½%. All the ores treated were therefore: 1428.1 ts. with auriferous Ag.=859.7 kg. (Ag=864.24 kg., Au=4.57 kg.) 38 ts. Cu. and Pb. below ½%. The production in the several products collected separately was:

In the precipitated metals, 26.6 ts. containing: 599.8 kg. auriferous silver (Au=.747 kg., Ag=599 kg.) Cu=4.77 ts., Pb=3.58 ts.

In the precipitated sulphurets 14.12 ts. yielding: 181.4 kg. auriferous Ag (Au=2 33 kg. Ag=179.1 kg.) and .5 ts. Pb.

In the flue dust 48.4 ts. yielding: 35.2 kg. auriferous silver (with Au=1.33 kg. Ag=34 kg.), .15 ts. Cu and 10.9 ts. Pb.

In aggregate were collected products: 89.07 ts. with 816.4 kg. auriferous silver (with 4.4 kg. Au, 812 kg. Ag), Cu=4.92 ts., Pb=19.97 ts. If the returns are subtracted from the yield of the ore destined to be treated there results a loss of auriferous silver 47.8 kg. (loss of Ag=47.6, of Au=.16 kg.) by neglecting the base metals in the ores not accurately tested.

The returns of precious metals furnished from the precipitated metals is: Ag=69.7%, Au=16.3%; from the precipitated sulphurets: Ag=20.8%, Au=51.1%; from the flue dust: Ag=3.9%, Au=25 6%.

The total yearly production of the melting and extracting works amounts to about: 55 kg. Au, 1700 kg. Ag, 19 ts. Cu., 134 ts. Pb., at the value of 256,000fl.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER VIII.

By GEO. F. BECKER.

On the Pacific coast the gold is commonly associated with black sands, consisting largely of magnetic iron oxide or titanic iron ore. On the Rand, magnetite, though not absent, is relatively rare. It does not follow that the deposits of the two regions are not similar. The magnetite on the Pacific beaches does not originate to any extent in the gold-quartz veins, but in country rock. If the country rock happened to be poor in magnetite, the sands would not be black. Such seems to have been the case in the Jurassic gold-bearing marine conglomerate of Placer county, California. Again, the magnetite may have been in part converted into pyrite by the sulphur-bearing solutions accompanying the intrusion of the dikes.

The beach sands on the Pacific coast of North America and those of New Zealand form along the shores of extensive gold-bearing regions. It is natural that they should so form; it is difficult to comprehend their entire absence, and it is hard enough to understand why they are not more abundant. What has become of the immense quantity of gold swept away by erosion from the western slope of the Sierra Nevada and the auriferous territory of northern California? It has certainly been carried to the sea, and, as a heavy metal, some of it has been left along the coast in the beach sands. The aggregate quantity of gold in the sand is very great, but I see no probability that it represents more than a small fraction of the gold which has been scattered by Nature's hydraulic process. The only answer is that the metal has been so triturated, so "floured," that it has been swept away into the abyss of the Pacific slope and perhaps slightly dissolved in the waters of the ocean. Just as very fine gold cannot be saved in a sluice, so still more finely comminuted gold must remain suspended almost indefinitely in ocean currents.

Now, at the time of the formation of the conglomerate the Witwatersrand lay along the shore of an extensive auriferous area, presenting belt after belt of quartz veins striking in a direction nearly parallel to the coast. The drainage probably cut across this area, bringing down auriferous detritus. The streams certainly brought down vein quartz from a gold-bearing country. This supply was more abundant at some times than at others, the variation probably representing fluctuations in the gradual upheaval of the land area. It is clear that vigorous currents swept the shore, for otherwise such accumulations of conglomerates could not have been formed. Here, then, there were all the conditions for the formation of beach placers. It might have been predicted *a priori* that, if littoral deposits could be found within a moderate distance to the southward of the area of Mashonaland, Matabeleland and northern Transvaal, they would be nearly certain to show alluvial gold.

It has been argued that, if the deposits of the Witwatersrand are ancient beaches, they are substantially unique. It is certainly true that they are the richest of such deposits ever known, but geologically and qualitatively they by no means stand alone. Europe, America, Australia and New Zealand all possess auriferous marine gravels of pre-Tertiary age. Ancient river gravels would be preserved only under exceptional circumstances, and it is doubtful whether a single case of pre-Tertiary gold-bearing river gravels is yet known. It is interesting to compare other old gold placers with the deposits of the Witwatersrand, and for that reason notes on some of them are added to this paper. They certainly reenforce the argument for the alluvial origin of the gold in the banket, and it may be noted that nearly all of these deposits lie in the regions known to contain gold-quartz veins older than the marine strata.

Let it be assumed, for the sake of argument, that the banket really represents a marine placer of early Paleozoic age, formed off the shore of an extensive gold-bearing region, and since injected with dikes. One would then expect to find the gold in the coarser streaks of the resulting conglomerate and on the lower side of such streaks. The reef would extend for many miles, and perhaps for many hundreds of miles. The tenor would depend in part on the strength of the currents sweeping along the coast, and in part on the quality of the material fed into the sea at different points, or at the same point during different seasons. Hence, conglomerate of a given coarseness would be richer at some points than at others, and there might be almost barren portions or beds, but the distribution would be in patches, not in chutes. The gold would almost all be finely divided, for nuggets would commonly remain in the rivers. Pyrite would almost certainly appear in the sands, but experience shows that gold-bearing pebbles would be rare. When the conglomerate was upheaved, injected with dikes, and metamorphosed, it would be found that the dikes sometimes cut poor patches and sometimes rich ones, their disposition having nothing to do with the original distribution of the gold. The sandstones would be converted into quartzites, and re-crystallization of gold and pyrite would occur to some extent. In short, it seems to me that deposits exactly analogous to those of the Rand must form in this way, while in some details the composition of the banket would doubtless depend on the lithological character of the back country.

Thus, it seems to me that there are no valid objections to the theory of marine placer origin and no noteworthy features left unexplained by this theory, while so much cannot be said of either the impregnation or the precipitation theory. The beach deposits of the Pacific form an excellent instance of such marine placers, although they are not so rich as those of the Rand. On the other hand, no case is known of an extensive gold deposit which is certainly an impregnation in sand or gravel, nor is there an established case of marine precipitation.

(*To be Continued.*)

*Eighteenth Annual Report Mineral Resources of the United States.

Chemistry of the Cyanide Process.

Professor Faraday in 1857 informed the scientific world that gold leaf, as resting on the surface of a solution of potassic cyanide, dissolves about one hundred times quicker than gold leaf that is wholly immersed therein—a fact taken advantage of by cyaniders for a rough and ready test of the strength of their cyanide solution. Faraday stated that "air voltaic currents are formed in these cases" (the cyaniding of gold resting on the solution), "and the gold is dissolved almost entirely under their influence." Another theory is that taking cognizance of the fact that oxygen is a necessary factor in the process, and is far more plentiful at the surface of the cyanide solution than in the solution itself, this rapid dissolution of gold at the surface is due to the plentiful supply of oxygen. M. Maclaurin suggests that it may be considered as only an extension of the under surface of gold in the position described, a theory that, if true, goes to explain the particular phenomenon under consideration. This theory maintains that there is generated at the surface of the cyanide solution on which gold is resting a current of electricity, and that this current causes the solution of the gold, that "the solution of this gold is due to electrolytic action obtained by the action of the cyanide and the oxygen of air," a hypothesis still under discussion.

Wm. Skey holds that the "air voltaic current" theory is not tenable. If the gold leaf and the surrounding cyanide solution be covered with a thick layer of kerosene or gasoline, the dissolution of that gold is but little retarded. Ether can be substituted for these oils with like effect if only the cyanide solution is very strong or has been heavily salted to prevent the downward diffusion of the ether, and so favor the existence of a hard line of demarcation between the two liquids. All these substances are permeable by oxygen; still, apparently, not notably more so than water is. But the same results happened when they were depleted of their contained gases by passing coal gas through them, and even when the gold leaf itself was also depleted more or less of the air lodged in its pores by the same gas, which goes to prove that, for the rapid dissolution of gold leaf on the cyanide solution, a body of air resting on that solution is not necessary; that there is entangled in the pores of the gold leaf, or mechanically absorbed by it, a sufficiency of oxygen to provide for a rapid dissolution of the metal.

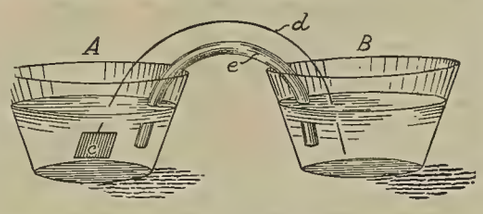
This raises the question, Why should gold leaf in a cyanide solution be very much longer in dissolving than gold leaf lying on the surface, and under a layer of oil or ether, the necessary supply of oxygen being in each case, as it were, afoot—that is, lodged in the gold leaf? The answer is: A piece of gold that is immersed in a cyanide partly-solution, weak or strong, not only dissolves rapidly at the surface of that liquid, but also rapidly—often just as rapidly—in the liquid itself, and even at those parts that are quite distant from the surface.

The part of the gold leaf that is immersed in the cyanide solution may be viewed as merely an extension of the under surface of the gold leaf that lies on the surface of this solution. Gold in strong solutions of the cyanide is always positive to gold in weak solutions of this salt, and the current thus generated is sufficiently strong to give electrolytic effects—the deposition of copper and gold from their sulphate and chloride, respectively. These results, while showing that the rapidity with which gold dissolves when lying on a cyanide solution is not due to the generation of any electrical current at all, shows just as clearly the fact of the potency of cyanide solutions of different strengths in contact with the gold for accelerating the cyaniding of the metal; and the inference is that the rapidity with which this surface gold dissolves is in greater part, if not wholly, due to the action of cyanide of different strengths—to the action of the stronger solution on the under surface of the leaf, its upper surface forming in the weaker cyanide the negative pole.

If differentiation of the strength of the cyanide solution does explain the rapidity with which gold, as placed on a cyanide solution, is dissolved, differentiation in strength must be a factor in the dissolution of gold in tne cyanide process generally. The percolation of the cyanide solution through the charge—this "drip, drip, drip"—in a damp atmosphere, is all favorable for its production and maintenance. Thus the cyaniding of gold appears to Mr. Skey to be eminently an electric process; not that the gold is dissolved therein by means of electric currents, but that it generates these currents. He claims that the dissolution of gold in the cyanide is analogous to the dissolution of zinc in the sulphuric acid of a Smee's cell. If means are not present for the production of the voltaic circle, no pronounced, no regular, action takes place—it is merely a difference in the construction and the arrangement of the cell. Thus, in the Smee's cell it is one solution and two metals, but in the cyanide process one metal and one solution at the start, which solution becomes of various strength, and so fulfills the condition necessary to insure the existence of the voltaic circle.

Two theories have been constructed to show how the chemical actions obtaining in the cyanide process are initiated and brought about, one "that the action of oxygen is due to its strongly electric negative relation to gold in the cyanide solution," the other, that the cyanodizing of gold is always effected by a displacement of another metal from the cyanide used by it, that, in fact, "pure alkaline cyanides cannot dissolve gold"—meaning, of course, in the oxygenated solution. To meet this theory one need only ask, What metal or metals are likely to be in the cyanide, or in the auriferous mine stuff itself, that gold could displace from a cyanide solution? Mr. Skey refers to the metals platina, iron, lead and mercury as being negatives to gold in cyanide solutions; but certainly platina is out of the question, while iron would not be replaceable. There only, then, remain mercury and lead, and neither of these is present in cyanide solutions except on very rare occasions. But gold as prepared from its chloride by oxalic acid is dissolvable by the weak cyanide.

Two theories have likewise been formulated to explain how gold becomes dissolved in the cyanide process. One is that given by Mr. MacArthur. This assumes that water is decomposed, its oxygen being used to replace the cyanogen necessary to cyanide the gold, while its hydrogen is evolved. Experiments in this matter give results against this. *A* is a vessel containing potassic cyanide of any strength, in which is a sheet of gold leaf (gummed to paper). *B* is another vessel, containing the acid in water



heavily salted to drive out the oxygen that might interfere with the result. In this vessel is a gold wire *d*, which is connected with the gold leaf *c*. Interpolar connection is completed by the bent glass tube *e* that is full of hydrated, but almost solid, gelatine, slightly salted for conducting purposes, if necessary.

Soon after this arrangement is set up a stream of gas may be observed issuing from the gold or platina wire. This is hydrogen, and the evolution goes on continuously till all the gold leaf is dissolved. It is necessary to have a small cathode and a large anode to be certain of success in the experiment, as cyanodizing is at the best a slow process, and even concentrated solutions of the acids and salts let in oxygen fast enough to oxidize hydrogen to a notable extent, and thus prevent its liberation being noticed.

These results show that hydrogen can be liberated in a cyanide process, and that in the process as carried on the gas is not evolved, but transferred in a liquid form to the oxygen present at the anode. The process demands that the oxygen shall be present and in quantity, while the alkalinity of the solutions favors the rapid union of this gas with oxygen before it can assume the gaseous form, or even before it can in reality become free.

The next theory to explain the chemistry of the process involves the decomposition of potassic cyanide, the cyanogen combining with the gold as before, while its potassium combines with oxygen gas as present in the solution. This view appears reasonable, until one takes cognizance of the fact that he can, by a slight modification in the process just described, get an evolution of hydrogen—that is, by transferring the negative gold—the negative pole—from its alkaline to an acidic solution.

In the cyanide solution one has not the simple compound potassic cyanide to deal with, but the hydrocyanide of potash, corresponding to the hydrochloride of potash. On one hypothesis the cyanodizing of gold is a combination of two simple operations. The affinity of gold for cyanogen and that of oxygen for hydrogen in the presence of an alkali conjointly determine the decomposition of the hydrocyanic acid, a gold cyanide forming at the one pole and water at the other. This constitutes the first operation. The dissolution of the cyanide by a portion of the remaining potassic cyanide is the second operation. In the first operation there is no precedence in action at either pole; the electric action at each pole commences simultaneously. True it is that to the old idea of voltaic electricity as a current it is not easy to reconcile one's self to the thought of a simultaneous start of electricity at each pole; but with a belief in Faraday's theory, that such electricity is only a polarization, it appears that this is the only way the action is started.

A singular phenomenon may be observed in regard to the action of the cyanide solution upon gold. The gold is deposited from very weak solutions of its chloride by phosphorus or hydrogen in such finely divided particles that they are indistinguishable—in fact, invisible—under the microscope, and are able to remain in suspension in water for an indefinite period. It was only by reflected light that Faraday could observe them. If we neutralize, or slightly alkalize, this red-looking auriferous fluid (one cannot designate it as a solution), then divide into two parts, and mix one part with, say, three volumes of the dilute solution, and mix the other part with a strong cyanide solution—say, the concentrated solution—it will be found that it is the gold in the strong cyanide that first disappears from view. Nor is it a neck-and-neck affair by any means, for in the strong solution three seconds may suffice to complete the operation, while in the case of the orthodox dilute solution the time required will be about five minutes—that is, about one hundred times longer. This is, of course, just what one would have expected a few years ago, before our working cyaniders had taught us the extraordinary potency of the dilute solution over the strong solution as a gold dissolver. Both the blue and the red gold of Faraday give these results.

These results seem to indicate that even in the supposed inert solutions of the cyanide the strong solutions rapidly act upon gold to a limited extent. It is not a matter of superior causticity, for it was found that strongly alkalizing the weak cyanide did not hasten the dissolution.

The explanation of this enigma may be this: In the strong solution cyaniding goes on at once, but only so far as to produce a colorless cyanide of gold that is insoluble, or but very slowly soluble, in the liquid. Gold taken out of a strong cyanide solution refuses to amalgamate, or, at least, very slowly amalgamates, showing that an insoluble saline film of some gold cyanide has enveloped it. Gold leaf upon a strong cyanide solution, in disappearing, leaves floating thereon a pale white ghostly-looking figure of its departed self. In the case before us, however, there is no transmutation of a vast number of metals—nor even of one; the white floating mass left by the gold is its cyanide, and it is believed to be this substance that always forms upon gold in strong cyanide solution, thus preventing or retarding its dissolution.

Smelting in Colorado.

The smelting situation in Colorado in the early part of '97 was about as follows: There were being smelted by the three smelters in Pueblo about 1500 tons daily of ore; by the two smelters in Denver, 900 tons; by the two smelters in Leadville, 900 tons; by the smelter in Durango, 130 tons; by the smelter at Silverton, 100 tons. The treatment charges on the ores smelted vary materially.

For silicious silver ores, averaging about 65 per cent excess silica, the smelters paid for 95 per cent of the silver, $19 per ton for gold if .05 ounces or over, and from $7 to $9 treatment charges.

On gold ores from Cripple Creek district, $20 per ounce for gold, $10 treatment charge.

On lead ores from Idaho, 95 per cent of the silver, 90 per cent of the lead, $7 for treatment.

Sulphide ores, 95 per cent of the silver, $19 per ounce for gold if .05 or over, $7 treatment charge; neutral 15 cents allowed for excess iron, and 10 cents charged for the excess silica.

Iron ores were usually bought at Leadville, the smelters paying 95 per cent of the silver, and an average of 75 cents per ton treatment charge on a 40 per cent excess iron basis.

For a long time past smelters were embarrassed by shortage of lead ore in comparison with the quantity of dry gold and silver ore treated. This has been the case to such an extent that it has not been unusual to run on an 8 to 10 per cent lead charge. Unless silver drops to a point which will dislocate Mexican finances, the economy of operating a mine in a silver country will stimulate the export of lead ores to the United States, notwithstanding the import duty—more especially if that lead be reexported and a rebate of the duty thus secured. The lead production of the United States from native ores was in 1896 about 174,692 tons, of which 130,000 tons were extracted from pure non-argentiferous ores. The amount, though large, was insufficient to supply the demand; for though in 1896 64,882,202 pounds were exported, 187,522,267 pounds were imported. The foreign supply can most advantageously be drawn as ore from Mexico and Canada. The customs returns for 1896 show that between 6000 and 7000 tons of lead came into the United States from Canada, and the balance from Mexico, the Canadian ores coming exclusively from British Columbia. The river and lake system of southern British Columbia is such that the readiest outlet is to the United States; argentiferous lead ores, unless of most desirable composition, can only be treated with a maximum of economy and accuracy of saving when a mixture can be secured, and this is best effected when supplies are drawn from many sources.

MANY mechanics have had their patience tried when pouring lead around a damp or wet joint to have it explode, blow out, or scatter from the effects of steam generated by the heat of the lead. The whole trouble may be avoided by putting a piece of resin the size of a man's thumb into the ladle and allowing it to melt before pouring.

Coast Industrial Notes.

—The new railway from Goble to Astoria, Or., will be finished May 1st.

—The orange growers of southern California will receive about $6,000,000 for this season's orange crop.

—California shipyards are turning out new iron and wooden vessels for the Klondike transportation trade.

—The Canadian Pacific Railway has made a further cut of 30 per cent in passenger rates. One can now travel from Vancouver to St. Paul for $10.

—The Manufacturers and Producers' Association will hold its regular annual meeting at Room 2, sixth floor, Mills Bldg., San Francisco, on the afternoon of the 23rd inst.

—Los Angeles oil producers' trustees report a new contract with a San Francisco firm for 1000 barrels a month. That brings their total contracts for delivery at San Francisco up to 10,000 barrels a month. They believe they will be able to double this before long.

—The United States Government will next week send an expedition from Vancouver, Wash., to find a practicable route up the Copper river, Alaska, to the Yukon basin. Fifty men and three officers of the Fourteenth Infantry will leave Vancouver on March 15th.

—In San Luis Obispo and Santa Barbara counties, Cal., there remains fifty-five miles of the railway in the Coast division gap to be built. About 1000 men will be put on. It will take ten months to finish. When completed, the through East-bound passenger trains will be run over that route.

—This week President Paget of the Chihuahua & Pacific Railroad Co. signed a contract with the Nassau Construction Co. for the construction of a steam railroad in Mexico from the silver mining regions of Chihuahua to the Gulf of California, 350 miles. Under the terms of the contract 120 miles must be completed before November 1st.

—Trade in California sweet wines shows an increase. The total estimated product for this year is 3,000,000 gallons, 25 per cent more than last year. Heretofore there has been little profit in the vintage because of the fierce competition of growers; the producers have now made arrangements with a sweet-wine syndicate which will control the entire product of the State and give all concerned some share in the profit.

—On the new Siberian railway 5000 miles of steel rails have been laid already at a cost of 350,000,000 rubles. July 1, 1904, it is thought, will see locomotives running from the shores of the North to those of the Japan sea. Within eighteen months trains are to run over the Siberian road to the Amoor river. Thence, by fast steamer, passengers and freight are to be pushed on to Chaborowka; thence, in eighteen hours, over the South Russian section of the Siberian road to Vladivostock, making the distance from England to the most important harbor of the Japan sea seventeen and one-half days. It is estimated that when the road is in working order, after the first few years and high rates of speed across Siberia are attained, the entire trip will be made in nine days and two hours.

—To exporters of merchandise or machinery to Mexico it is of great importance that everything be packed in accordance with the customs regulations of Mexico, and in such a way as to insure an immediate and proper tariff classification. Some of these regulations are different from those of the United States customs houses. Some of them are apparently unnecessary and vexatious, and the energetic American shipper will probably make complaint if he happens to make a mistake and is fined or delayed in his business; but when the American crosses the boundary of his own country he is among a people who do as he does when at home—run their own business to suit themselves. However peculiar their ways may seem, however complicated their red tape may run, no matter how many old-fashioned ways may prevail or how many improvements might be suggested, their way of doing business is their own and they have the right to enforce it. The country is theirs, and the American who goes abroad with fixed standards of comparison, ironclad ideas of how he is going to do business in another man's country, is doomed to vexation, trouble, expense and disappointment. The importance of this matter of packing goods purely for the Mexican market is so great as to be the principal reason why many articles which should be furnished by the United States are still bought in Europe by Mexico. A few American firms have made an exhaustive study of conditions in Mexico and humor the trade in every possible way. The result is they have a large and profitable business which they have earned and which they keep by adapting it to the needs of the country and the whims of the people. The manner in which the trade in packing-house goods has been built up is an excellent illustration of this. It was found by the Armour Packing Company that the empty coal-oil cans were used by the Mexicans to pack lard in. The cans were cheap, of convenient size to handle and easily packed on the back of a burro. The suggestion was sufficient, and now the Armour Company ships lard to Mexico in tin packages made to resemble the regular five-gallon coal-oil can. The whims of the trade are shown in the experience of a New York firm selling large quantities of candles. By persistent work they built a big trade in Mexico. One brand of their candles was especially popular. These candles were wrapped in blue paper and sold in immense quantities. For some reason or other the color of the paper was changed to red. The results were disastrous. The sale of the candles suddenly stopped. Their agents in Mexico told them that the people kept asking for the candles done in blue paper and would take no other, as they could not be convinced they were the same goods. The New York firm finally sent over a lot of blue wrappers and they were substituted for the red ones. The candles again sold freely and the business of lighting Mexican houses with American candles continues with profit to all concerned.

Personal.

MR. CHAS. E. ELLIOTT has been elected Sec. Potosi M. Co.

JAS. GOULD, a mine owner at Gold Run, Cal., is in San Francisco.

D. FISHER succeeds S. Love as Supt. Union Con. mine, Jackson, Cal.

J. O'CONNEL, Supt. McKinley mine, Columbia, Cal., is in San Francisco.

HON. R. H. CAMPBELL leaves San Francisco for Cariboo, B. C., next week.

A. BLUNDELL, Supt. Murchie mine, Nevada City, Cal., is in San Francisco.

O. S. BUCKBEE has resigned as Supt. of the Confidence at Confidence, Cal.

GEO. SCHMITT, Mgr. Nat. Con. mine, Redding, Cal., is in San Francisco.

A. COLBY, owner of the Fair View mine, Sonora Cal., is in San Francisco.

W. SKAGRUN has succeeded J. J. O'Brien as Supt. Washoe mine, Butte, Mont.

M. W. MATHER, Supt. Crœsus G. M. Co., Alleghany, Cal., is in San Francisco.

B. F. HARTLEY succeeds A. M. McDonald as Supt. Montauk mine, New Castle, Cal.

W. H. CLEARY JR., Supt. Petticoat mine, Railroad Flat, Cal., is in San Francisco.

CHAS. BUTTERS will leave Johannesburg, S. A., for San Francisco on the 15th inst.

J. B. HOBSON, Mgr. Horsefly Hydraulic M. Co., Ashcroft, B. C., is visiting San Francisco.

W. F. ENGLEBRIGHT of Nevada City, Cal., is ill at the Hotel St. Nicholas, San Francisco.

S. W. JACOBS, part owner of the Lost Emigrant mine, Summit, Cal., is in San Francisco.

R. T. PIERCE, Supt. May Lundy mine, Lundy, Cal., is in San Francisco, en route to Boston.

H. A. PRESTON, owner of the Preston Hill mine, Sonora, Cal., has returned home from San Francisco.

J. FITZGERALD becomes Supt., and A. Trittenbach, Gen. Mgr., of the Confidence mine, Confidence, Cal.

JAS. E. KEELER was this week elected director of the Lick Observatory to succeed Prof. Holden, who recently resigned.

H. W. FAIRBANKS has returned from an extensive surveying and reconnoissance of 600 square miles of oil-yielding area in southern California.

H. J. REILING, Pres. Bannack Dredging Co. of Chicago, is in California, examining mining properties with a view to dredging operations.

J. J. HALPIN of New York has resigned the presidency of the Brunswick Con. mine, Grass Valley, Cal. He is succeeded by F. J. Fletter of San Francisco.

A. McL. HAWKS, chief of construction of Chilkoot Railroad & Transport Co., has returned from the Chilkoot Pass and reports that the wire-rope tramway will be completed and in operation on the 15th inst.

Recent California Mining Incorporations.

Jamestown G. M. Co., San Francisco; capital stock $500,000, subscribed $1000; J. P. E. Heintz, E. P. Heald, E. J. Molera, E. McAllister, C. Y. de Lay.

Golden Jubilee M. & M. Co., Napa; capital stock $200,000, subscribed $36,000; S. Newcomer, S. Wardner, J. F. Medary, N. Samuels, C. F. Ruse, C. A. Harvey, M. A. McDonald, J. B. Bacon.

Columbia G. & S. M. Co., San Francisco; capital stock $80,000, subscribed $22,000; T. Fox, T. E. Danmeyer, W. A. Hale, E. D. Farish, R. Danmeyer.

Cherokee M. & M. Co., San Francisco; capital stock $300,000, subscribed $500; J. Peckham, T. R. Brown, H. H. Taylor, L. T. Marble, M. S. Martin.

Mexican M. Co., San Francisco; capital stock, $65,000; subscribed, $125; J. Urquehart, W. S. Cronk, D. Sheehan, E. W. Kay, L. B. McMurty.

Virginia Enterprise M. & M. Co., San Francisco; capital stock $250,000, subscribed $50; S. A. Loth, E. O. Jellinek, O. J. Mayer, J. Drossner, F. E. Groessler.

Recently Declared Mining Dividends.

Le Roi, British Columbia, $50,000; payable March 12.

Gold Mountain, Montana, 2 cents per share, $6000; March 5.

The '76 G. M. & M. Co., Colorado, 2 cents per share; payable March 19.

Wildman-Mahoney, California, 10 cents per share, $12,000; payable Feb. 20.

Pennsylvania, California, 5 cents per share, $2575; payable immediately.

Argonaut, California, 10 cents per share, $20,000; March 1.

Morning Star, California, $6 per share, $14,400; March 1.

Portland, Colorado, 1 cent per share, $30,000; payable March 15.

Anchoria-Leland, Colorado, 1 cent per share, $6000; payable March 15.

Calumet & Hecla, Michigan, $10 per share; $1,000,000; payable April 1.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 1, 1898.

600,055.—BOTTLE LOCK—S. Adler, S. F.
599,923.—TRUCK—E. C. Atwood, Golden Gate, Cal.
599,824.—COUPLING FOR TAPPET CAMS—T. J. Barbour, S. F.
600,116.—SWINGING COT—J. H. Benning, S. F.
599,926.—CONCENTRATING BELT—W. F. Bowers, S. F.
600,059.—MUD DRUM AND BOILER—W. J. Brady, S. F.
599,830.—STEAM ENGINE—A. E. Cobb, Phœnix, A. T.
600,109.—RING SLIDE FOR ROPES—C. A. Conger, Oakland, Cal.
600,110.—EYE FOR ROPE HALTERS—C. A. Conger, Oakland, Cal.
600,111.—SEWING MACHINE—N. P. Duncan, Hanford, Cal.
599,895.—WRENCH—English & Stranahan, Portland, Or.
599,960.—ENVELOPE—P. E. Gillette, Grass Valley, Cal.
599,898.—CHECK REIN HOLDER—O. Gravelle, Spokane, Wash.
599,701.—GOLD SAVING APPARATUS—G. Griesche, Berkeley, Cal.
599,845.—WATER WHEEL BUCKET—E. P. Jones, Alameda, Cal.
599,847.—RAILROAD SWITCH—B. J. Kelly, Corvallis, Or.
599,717.—PICK—J. H. Maddux, San Luis Obispo, Cal.
599,856.—LEMON SQUEEZER—E. J. Middlekauff, S. F.
599,974.—PNEUNATIC TIRE—O. H. Packer, Junction, Nev.
599,793.—HANDLE BAR—O. R. Pihl, Portland, Or.
599,871.—CLOTHES DRIER—J. L. Siefkes, West Point, Cal.
599,743.—NITRATES—E. A. Starke, San Rafael, Cal.
599,744.—BROOM HOLDER—H. L. Steinmeyer, Sacramento, Cal.
599,745.—SASH FASTENER—H. L. Steinmeyer, Sacramento, Cal.
600,100.—PIPE VISE BENCH—G. F. Tong, Sacramento, Cal.
599,819.—GOLD SAVING APPARATUS—E. L. Weed, Ellensburg, Or.
599,756.—WAVE MOTOR—P. Wright, Los Angeles, Cal.
28,338.—DESIGN, GAME BOARD—G. L. Smith, Patton, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey. Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PICKS.—James H. Maddux, San Luis Obispo, Cal. No. 599,717. Dated March 1, 1898. The object of this invention is to provide easily detachable and removable points for picks, with means for locking them securely to the main portion or stop, so that they cannot be disengaged or loosened by use, while they are easily removable and replacable when worn out. It consists of a central eye, or socket, having outwardly projecting arms with separable points, the meeting ends of the arms and points being halved together in planes parallel with the handle, having longitudinal projecting ribs and channels upon the meeting faces and dowel-pins by which the parts are locked, and a bolt or bolts passing through so as to secure all parts solidly together.

ADJUSTABLE PORTABLE PIPE VISE BENCH.—George F. Tong, Sacramento, Cal.; one-half interest assigned to M. K. Barrett of same place. No. 600,100. Dated March 1, 1898. This invention relates to a portable bench which is especially designed as a support for vises for pipe and screw thread cutting devices. It consists essentially of a heavy table having hinged to its lower surface at the edges legs which diverge widely from their point of hinging to the bench so as to form a wide-based tripod. In conjunction with these legs are brace bars, also pivoted or fulcrumed to the lower part of the bench extending diagonally downward, having clamps by which they are adjustably locked upon the main legs so that the latter are held firmly in place. The lower part of the legs are provided with means to receive transverse bars, which prevent their sinking deeply into the ground, and they also have means for holding them in place.

APPARATUS FOR SEPARATING AND SAVING PRECIOUS METALS.—Gustav Griesche, East Berkeley, Cal. No. 599,701. Dated March 1, 1898. This invention relates to an apparatus which is designed to separate heavy valuable or precious metals from sand, gravel or other gangue with which they may be found associated in a free condition. It consists essentially of a tapering revoluble screen mounted upon horizontal shafts, means for supplying the material to be separated to said screens, semi-circular collecting troughs surrounding the lower part of the screens having discharge chutes opening from them and a series of oscillating troughs inclined upwardly from the receiving toward the discharged ends, said troughs being divided into separate compartments and having independent agitated blades mounted upon the longitudinally centrally disposed shaft and revoluble independently within the compartments with means for varying the inclination of the troughs. A suitable supply device is adapted to deliver the material into the apparatus, and a discharge chute at the end conveys away the worthless material after the separation is complete.

MUD DRUM AND BOILER CONNECTION.—Wm. J. Brady, San Francisco, Cal. No. 600,059. Dated March 1, 1898. This invention relates to an improvement in mud drum connection for boilers. It consists essentially in a means for detachably connecting the drum with one or more boilers, a means for making a more perfect joint between the connecting nozzle and the drum by the use of compensating plates to which the flanges of the nozzles are first riveted, the plates being afterwards riveted to the mud drums.

BOTTLE LOCKING DEVICE.—Solomon Adler, San Francisco, Cal. No. 600,055. Dated March 1, 1898. This invention relates to a device which is especially designed to lock the stoppers of bottles to prevent the bottle being surreptitiously opened. It consists essentially of a cap adapted to fit and enclose the bottle stopper arms extending downwardly upon each side from the cap and movably pivoted thereto, a jointed rim fixed to the lower end of the arms adapted to close around the neck of the bottle below the enlargement at the top, this rim being made of segmental plates having such radial diameter as to make them rigid in that direction, and with this a means for adjusting the rim to fit any sized bottle neck and means for locking it when it is so adjusted.

Books Received.

"*De Pontibus, a Pocketbook for Bridge Engineers,*" 400 pp. octavo, morocco, J. A. L. Waddell: A technical treatise on the principles of bridge construction and their successful application. Useful to everyone likely to be in any way connected with bridge building. There is no theory in the book; practical information and valuable experience are supplied. The chapter on "Inspection of Materials and Workmanship" is alone worth the price of the book, $3. Jno. Wiley & Sons, New York City.

"*The Language of Light; or, The Mirror of Truth,*" 260 pp. quarto, Terrence Duffy, San Francisco; price, $2: A farrago of rubbish, whose only redeeming point is clearness of type and good mechanical production, affording a job to some deserving printer.

"*The Chlorination Process,*" by E. B. Wilson, E. M., 8vo., 125 pp. Jno. Wiley & Sons, New York, $1.50: This book discusses a process that was first made commercially successful in California, and which has been exhaustively treated in these columns. Scant acknowledgment is made regarding the source of information, the omission being most noticeable from the fact that the mining world universally recognizes what California miners and this paper have done in this specialty. The book adds little to the stock of information on the subject, but, as a compilation, is in convenient form.

"*Lubricants, Oils and Greases,*" 8vo., 54 pp., I. I. Redwood; published by Spon & Chamberlain, 12 Cortlandt St., New York City; $1.50: A treatise intended to furnish engineers and others with information regarding the composition of lubricants in general, entering largely into the chemistry of the subject. The book is of probable value to the manufacturer of lubricants.

Commercial Paragraphs.

THE Baker Iron Works are building for James, Osgood & Kellam a 3-stamp (850 pounds) gold mill, complete, for the Sunnyside mine, in the Chuckawalla district, near Saiton.

AT Sutter Creek, Cal., Knight & Co. are building at their machine shops two 4-foot Knight water wheels and appurtenances for an improvement company at Bakersfield and an air receiver for the Argonaut mine, 44 inches diameter and 24 feet long.

THE Colorado Iron Works Co. are building a set of 54x8-inch high speed, narrow-face rolls for the Anaconda Copper Co., Anaconda, Mont. The Old Jordan & Galena M. Co., Salt Lake City, Utah, have placed an order with the Colorado Iron Works Co. for machinery for a dry crushing plant, consisting of 42-inch taper cast-iron dryer, rolls, ore breakers, feeders, etc.

THE *Two Republics* of the City of Mexico says: "The Central y Anexas Mining Co. of Zacatecas has just closed a contract with Geo. E. Ames, Jr., representing the Union Iron Works of San Francisco, for machinery which will double their mill capacity at Zacatecas. The contract amounts to something over $20,000. The Union Iron Works made the installation of the first plant used by the Anexas y Cia, whose mining property is among the most promising in the Zacatecas belt, and this is substantiated by the present increase of their already extensive plant. The Union Iron Works are doing their share in selling mining machinery in this country, and it is understood they have already furnished a large pumping plant for use in Merida, Yucatan."

IT is often convenient to make an article of cast iron that needs to be finished, and which should be very hard. Cast iron can be hardened as easily as steel, and to such a degree of hardness that a file will not touch it. Take a half pint of vitriol, one peck of common salt, half a pound of saltpetre, two pounds of alum, a quarter of a pound of prussiate potash, and a quarter of a pound of cyanide potash; dissolve in ten gallons of water. Be sure that all the articles are dissolved. Heat the iron to a cherry red and dip it in the solution. If the article needs to be very hard, heat and dip the second, and even the third, time.

Electricity in Mining Operations.

In the February issue of the *Engineering Journal* of Stanford University, Cal., Prof. F. A. C. Perrine, in an article with the above caption, says:

It is popular to say that we do not know the nature of electricity, and therefore it is equally popular to use the name Electricity as a conjuring word, assuming that its introduction into any particular system of operations would necessarily facilitate and cheapen them. Although it is true that we may now give a scientific definition for electricity as well as we can give a definition of light and heat, and a great deal better than we can define gravitation, we are not required to use an exact scientific definition in its engineering application. A sufficiently correct definition may be made by saying that electricity is a means of transmitting and utilizing energy without reference to the form in which the energy is to be employed. This definition includes the points of usefulness of electricity in engineering operations and excludes every other means of transmitting energy. Electricity has often been spoken of as a belt, but no belt can transmit and directly transform energy derived from the pulley of a steam engine into light, heat or motive power, as may be done by the use of this agency; and since it is thus readily transmitted to be used in all manner of energy transformations, it is capable of becoming the willing servant of the miner, as it has been successful in its application to other engineering operations.

In mining it has actually been successfully employed in milling, hoisting, haulage, pumping, drilling, lighting and in effecting electrolytic decomposition. Yet, while these operations include almost the entire field of the miner, there is no doubt that the general introduction of this means of transmitting and utilizing power shows a decided tendency to lag behind other forms of development in mining operations along the Pacific coast. For this there are undoubtedly two distinct reasons. In the first place, the machinery already developed has not been constructed with a view to the special conditions we find here; and, in the second place, the mining engineers and superintendents within this region have not obtained the special training that would enable them to adopt the machinery already constructed and adapt it to their special needs, or to develop new types of electrically-operated machines to serve the particular problems we have here to face. In a sense the lack of technical electrical training on the part of the mining engineers and superintendents who are operating our mines includes the first reason given for its tardy introduction in this field, since we should naturally expect the necessary machinery improvements to come from those most familiar with the particular conditions, and we may not, therefore, expect to see the best use made of this source of power transmission and development until those in charge of our mines have taken the pains to render themselves completely familiar with this branch of engineering. Even were suitable machinery available to-day, these mining engineers and superintendents are not yet sure of themselves when left alone with the electrical machinery after the installing mechanic has returned to his factory, and, until they are sure of their ability to do whatever repair work may from time to time be necessary, it will not be wise for them to attempt its use. A majority of the repairs must always be made on the ground, and quickly, or the introduction of electrical machinery will have the effect of stopping all workings and flooding the mines while an expert is being sent from the nearest manufactory. Also such lack of training will generally bring about unnecessary break-downs from the development of little faults which the mechanic, untrained in this specialty, can never hope to foresee, since that which goes wrong in an electrical machine does not manifest itself to the eye or ear, or even to the hand, until it has reached disastrous proportions. The trained mechanic with his instruments can detect defects and repair them before they amount to break-downs. This training is something which the mining engineer must acquire, or his place will be taken by a new class of mining engineers, who can make use of this agency, for the many transmission plants now being developed in the mining regions will compel the introduction of electrical machinery as fast as the present contracts for water power shall expire and the cost of wood for steaming becomes excessive.

Again, as has been said, this new race of mining engineers will find before them many of the particular problems connected with the introduction of electricity into our mines entirely unsolved. The principal uses of electricity in mining operations at the present day are to be found in coal mines in the East, where the problems are altogether different from those met in gold and silver mining in either quartz or soft rock.

Perhaps the largest amount of power now used in these mines is absorbed in drilling, and while the electrical diamond drill is a successful machine, this drill cannot take the place of the pneumatic percussion drill, nor in this class of work can we make use of the coal auger or the under-cutting chain machine, so effective in coal mining operations. The electric percussion drill is to-day a failure in underground workings. Much surface quarrying has been satisfactorily done by its aid, but its great weight and the high temperature it attains place it at a serious disadvantage when compared with the pneumatic drill. Many times this problem has been attacked with great energy and much money fruitlessly spent in an attempt to develop a satisfactory percussion drill, with the sole result of proving that an electrical machine cannot be directly applied to this service. Whether there is or is not an indirect method of making use of electricity in drilling operations remains for inventive genius to show us.

But even in simpler needs than this of the percussion drill, it is evident that much engineering genius must be brought to bear on the problems before we can hope to see this form of energy successfully utilized. The best and cheapest wire cable to be used under the conditions here found is yet to be developed, and yet there is no need for any particular display of inventive ability. There is a necessity only for an engineering study of the particular conditions which are not at all those familiar to the manufacturers who are engaged in cable making. They are prepared to furnish cables for the underground transmission of electrical energy, heavily insulated with rubber or other compound, and protected by lead piping; but these heavy cables are difficult to maintain down vertical shafts, the lead being attacked by acidulated water and by the organic acids formed in the mine timbering. The manufacturers do not and cannot realize the immense importance of special construction for this field, although the information they now have at hand would enable them to construct a satisfactory cable for the engineer who is thoroughly familiar with the conditions under which the cable is to operate, and who has at the same time some knowledge of the materials available for their manufacture.

In the matter of pumping there is not a great difference between coal mining operations and those in gold, silver and copper mines, and, in consequence, there are to-day electrical pumps that can be used satisfactorily for either sinking or as station pumps —more satisfactorily and more economically than is possible by any system involving the transmission of steam. These pumps are not more economical than those operated by compressed air where reheaters are employed, but, as is well known, the reheater is not always unobjectionable, and the electric pump has many advantages, even when compared with the use of the compressed-air motors in similar service.

Electricity for haulage is also well developed, but as the haulage in the mines we are considering is of no very great importance, this advantage of the application of electricity does not carry much weight.

In spite of the fact that we know the electric elevator to be a safe piece of machinery when used under the conditions met within an office building or manufactory, the application of the electric motor to hoisting, when the power is derived at a long distance from one of the established transmission plants, is not entirely successful. These transmission plants deliver current at a high potential over a multiphase line, and, although the induction motor is a good machine for steady power, it cannot yet be considered thoroughly satisfactory where it is called on to start and stop frequently and to run at variable speeds. This problem also demands considerable study on the part of the mining engineers, although it is a problem which the engineer may solve without attempting to become an inventor—since it is possible to transform the multiphase alternating current to a direct current by means of a rotary converter. This machine has been used satisfactorily in hoisting plants by applying to the hoisting gear a direct current motor, which may be controlled by means of a rheostat, or even operated in two parts and controlled by means of the series-parallel controller. At the same time, not every series-parallel controller is available for this use, since a difficulty is met, as the connection is changed from series to parallel and conversely. At that moment the motors must either be short-circuited or thrown on open circuit, and, although this presents no difficulty in surface traction, where the cars maintain their speed on account of their momentum, opening the circuit of the motor, while hoisting or lowering a car might cause an accident if the car was moving at a low speed without sufficient momentum for it to continue its travel during the time the change was being made in the connections. We thus see that the problem is one requiring a knowledge of the machinery to be employed as well as of the conditions under which it is to operate, which knowledge is only to be possessed by an engineer familiar both with practical mining and with electrical machinery.

Perhaps the most important application of electricity to mining at the present day consists of its use in electrolytic operations, and yet for these purposes we have as yet solved only the simplest problems, involving the disposition of a single metal, such as copper, from soluble anodes, and the recovery of other metals, such as gold and silver, from the slime remaining at the bottom of the electrolytic tanks. On the Pacific coast this method of operation is far less important than the recovery of metal from leached liquors, could this latter operation be satisfactorily developed. Up to the present time it had not been attacked by any one thoroughly familiar with all the conditions of the problem, whereas its solution would yield a rich harvest in the recovery of pure copper, in place of thousands of tons of copper now reduced by the cementation process.

This hasty review of the present condition of the improvements to be hoped for emphasizes a great need for training along the lines of the application of electricity to the particular problems of mining under the conditions as we find them. The solution of these problems is not merely something to be hoped for and something which may casually come in the future, but they are problems whose solution the present state of mining definitely demands, in view of the future expiration of water leases and the intense competition in mining, which will demand the employment of electricity furnished by the long-distance power transmission soon to be thickly scattered over the entire State.

Chlorination Tailings.

However carefully the ore may be treated, a certain portion of gold remains in the tailings, varying, other things being equal, according to the character of the ore. In case this results, in part, from the presence of particles too large to be entirely dissolved, that portion can be extracted by re-treatment, either with gas, by chlorine water, or by amalgamation. But a portion, which is sometimes quite considerable, still remains, and resists every mode of chlorination or amalgamation, and can only be extracted by smelting with lead.

In general it may be said that gold which can be seen by the aid of a lens, after finely grinding, and carefully washing, a sample of the tailings, can be extracted by chlorination, or amalgamation; but that which cannot thus be rendered visible can neither be chlorinated nor amalgamated, even if the ore be re-roasted, with or without regrinding. (If reground it forms a pasty mass which cannot be leached, being almost impervious to water.) Of course that ore is supposed to be properly roasted in the first instance.

Concentrated sulphides containing gold, and free from lead, will frequently yield as much as 98 per cent of the fire assay, if moderately rich, but the extraction of 95 per cent is considered a good result, from ore containing $100 worth of gold in a ton. As the material loses about 24 per cent of its weight in the roasting and leaching, it will readily be preceived that, if there has been no sensible loss of gold in the roasting, the tailings from such ore will assay about $6 per ton, and for every hundred tons of ore treated there will be 76 tons of tailings, containing $456 worth of gold.

Tailings of this character, consisting chiefly of iron peroxide, make an excellent flux for the smelting of galena. All the precious metal they contain is extracted, together with the lead set free from the galena by the action of the iron oxide, and may be considered as clear profit to the smelter, who is obliged to use some kind of iron flux, and can find nothing, unless it be metallic iron, better adapted to his purpose than these tailings.

Gasoline Engines in Mines.

At a recent meeting of Ohio engineers the use of gasoline engines to operate mining machinery was discussed. Heretofore the use of the gas engine or machine which emitted a blaze was considered dangerous in a mine, but it seems now that all scruples in this direction may be overcome.

W. Michel, chairman of a committee appointed some time ago, submitted the report of his committee. He said that gasoline engines had been applied to coal mining in but few cases, and in those had proved successful. Their adoption, however, had been rather slow. He attributed this fact to the unfamiliarity of the operators with the machine and the manufacturers with the needs of the operators. He considered the gasoline engine a great rival of steam, air and electricity in mining operations.

"For example," he says, "you wish to run a fan pump located one mile from the power plant. To conduct steam to this point would be out of the question, as the condensation would be great; with compressed air the friction would be enormous; with electricity, while the loss by resistance and leakage would be comparatively small, the motor would require constant watching. Not so with a gasoline engine; when once started it takes care of itself, using its fuel in proportion to the load carried, about all the attention required being to start, stop and oil it. No mechanical skill is required of the person in charge, a few simple instructions being sufficient to enable any one of average intelligence to manipulate it."

Mr. Michel thinks the idea of danger is all imaginary. He suggests that an external flame be never used, especially in a mine subject to gas, but says a good electric igniter, in which the flame is confined in the interior of the cylinder, is perfectly safe.

Mining Summary.

CALIFORNIA.

Amador.

On the 25th ult., in London, was held a meeting of the Jackson Exploration & Development Co., Limited. The chairman, in moving the adoption of the report and accounts, said that at the incorporation of the company the depth of the Amador Queen No 1 shaft was 292 feet 6 inches, and on Oct. 31, '97, Mr. Dye, the Gen. Mgr., commenced sinking again and from that date to the 5th inst. the shaft had been sunk 570 feet 6 inches, making a total depth of 863 feet. A telegram just to hand announced the sinking of an additional 31 feet, making a total depth of 894 feet. When he last addressed the shareholders the directors anticipated that a depth of 1000 feet would be reached by the end of last month, but, from various unavoidable causes, their expectations had not been fulfilled. No time, however, had been lost in following the advice of the company's consulting engineer, John Ross Jr., and of J. F Parks, viz: to sink to a depth of at least 1000 feet, at which level there was every probability of their finding good bodies of pay ore. The indications of the presence of gold in the Amador Queen mine were of a very promising character. Innumerable assays had been made, resulting in a trace of gold up to over $10 per ton, the majority showing from $2 to $4 per ton. As recently as last month a seam of white quartz, 6 inches wide, was struck immediately next to the foot wall in the south drift, No. 1, 500-foot level, assaying free gold from $2 10 to $3 72 per ton, and giving by fire tests $6 20 and $10 33, respectively. The quartz, after widening to 2½ feet, pinched out on Jan. 16th. This body of quartz was 30 feet long. A week later another 5 feet of quartz, 12 inches wide, was passed through, which assayed by fire test $10.33 per ton. On Jan. 22nd the quartz in the shaft at a depth of 843 feet was 2 feet wide and widening from the hanging wall in sinking. Mr. Ross' opinion was that this quartz would widen out and most likely make pay ore. The first two assays gave traces of gold, the third assay showed 5 cents per ton, the fourth 10 cents, the fifth 19 cents, and the sixth 26 cents, and in the last week in January the quartz assayed 43 cents per ton. A letter had since been received stating that the quartz continued, and was slowly improving in quality with depth, the assays on Feb 9th being in the south end 80 cents and in the north end 75 cents, and all over the shaft 77 cents That sample was taken from a depth of 869 feet. Hitherto they had not been so fortunate as to strike a body of pay ore of sufficient magnitude to set the mill constantly at work and contribute towards the cost of sinking the shaft, but such an event might happen at any moment. There could be no doubt that there was payable ore in the mine, and they only had to go deep enough to get it. They were surrounded by well-known and paying mines. The motion was carried.

Work on the Gritton gravel mine, near Volcano, is pushed day and night. One shift is driving the main tunnel ahead, while the other is making an upraise to tap the channel.

Work on the Blue Jay mine has suspended temporarily.

At the Potazuba mine on the 500 level the crosscut is progressing at the rate of 3 feet a day.

The Kennedy is crosscutting from the 2150-foot level of the north shaft.

The shaft at the Amelia has reached a depth of 450 feet.

The *Republican* says that an 8-foot ledge of milling ore was found in the 500-foot level of the Anita mine.

The South Eureka, says the Amador *Republican*, is paying from $2000 to $5000 monthly above expenses.

At the Central Eureka crosscutting is being done on the 500 and 800-foot levels. The *Republican* says that prospects there are encouraging and that a mill will be running on this property before the end of the year.

The January output at the Wildman-Mahoney is said to have been over $38,000.

Republican: The Oneida has reached 1534 feet depth. A crosscut will be run for the ledge. The company contemplates erecting a mill as soon as the property is opened up.

Butte.

Mercury: Near Big Bend J. A. Clark is working an old river bed and is reported to have good ground.

Thirty acres of mining land have been located by residents of Cherokee. The fact that this land was vacant is a recent discovery.

At the Big Betsy mine near Enterprise development work is progressing.

C. H. Schievely of Oroville and J. M. McClung, upon consideration of erecting a mill and hoisting works immediately, were deeded a one-half interest in the Sunnyside mine at Robinson Mills, near Forbestown. The mine has a shaft 65 feet deep, from which the owners have taken out about $3000, crushing the rock with an arrastra. The ore body is about 1 foot wide.

Calaveras.

(Special Correspondence).—The Petticoat mine near Railroad Flat is being thoroughly prospected. It has a shaft 450 feet on a 9-foot ledge. There are three chutes from 5 to 9 feet of a medium grade. If the property after further development warrants, a 10-stamp mill will be erected. Steam is used for motive power. W. H. Cleary, Jr., is Supt.

Railroad Flat, March 6th, '98.

At the Ghost mine sinking goes on.

Work has been suspended temporarily on the Gold Hill mine at Smith's Flat.

At the Curtis Con. the ore body is extensive and bears a high grade of sulphurets.

The Great Western is turning out good ore.

The *Echo* says that a good body of ore has been struck in the Zeigler Con., carrying free gold and sulphurets of a high grade.

At the Tracy mine the ore prospects satisfactorily.

The Harris mine intends putting up machinery and opening up the mine in first class shape. Some good rock has been taken out.

Work is going on steadily at the Keystone, near Altaville. The ore prospects well, and the ore body is extensive.

The Blair mine on Smith's Flat is sinking a 1000-foot shaft to reach the chutes of ore which are believed to lie at that depth.

The Keltz mine, near West Point, is producing good ore on the 400-foot level.

The Page Cutting, in the Sheep Ranch district, commenced piping last week.

Bush & Pache commenced piping last week on the Ide & Tewelliger hydraulic claim on San Antone range.

D. Fricot has let a contract to run a tunnel across O'Neil creek.

Doe & Jackson made a cleanup of $700 in the Shady Side, near Railroad Flat. Development shows a vein 10 feet in width.

El Dorado.

The Placerville *Nugget* says the Grizzly Flat gravel mine and 10-stamp mill have closed down for an indefinite time.

Democrat: The miners at Fairplay are making good use of the long-looked-for rain by running the gravel that has accumulated at their tunnels.

Humphries Bros. have struck good pay gravel.

Good pay has been found in the Hughes claim at Fairplay. As much as $5 has been taken out to the pan.

J. Mott made two good clean-ups this winter.

Twenty-five men are at work in the French Hill mine, six miles north of Greenwood, with good results. The sulphurets are sent to San Francisco.

Development has begun on the Grossman mine near Green Valley.

Nugget: L. Ferretto, near French Ravine, has struck good pay gravel.

Snow Bros. at Newtown have started another hydraulic mine.

Tacchino & Gardella have reopened the Iowa Gulch gravel mine.

DeLeat & Ricci are working the old Wolf seam diggings in Greenwood township.

Supt. Moss will resume operations at the Hines mine.

Sands Bros. are working the Eliza Ravine mine, Greenwood township.

A recent assay of ore from the Chittenden mine, Greenwood township, shows $6.30.

The Twin mine at Green Valley, a new prospect, yielded $142 from ten tons. The shaft is down 65 feet, showing a well-defined ledge of 14 inches.

Inyo.

In the Argus range the Inyo Con. M. Co. has within the last month gone down 50 feet on its 21-foot ledge in the Belanciana mine, and is crosscutting. The company has 200 tons of ore on the dump, which is improving with depth.

Kern.

Near the summit of the Panamint range, 8000 feet high, is the Cooper mine, said to have a rich vein of ore from 2 to 3 inches thick, showing gold all through. Sixty-three sacks milled at Ballarat yielded $10 per sack.

On the Comet and Starr, between Rand and Panamint, a shaft has been sunk 90 feet, following the ledge. Considerable ore is on the dump, assaying from $8.50 to $126 per ton. The ore is stained with copper and contains some silver.

An average of 2000 tons of ore is crushed by the mills of Garlock each month, producing between $45,000 and $50,000.

Miner: The Randsburg Railway Co. is delivering water in carload lots of 6000 gallons at $20 per car at the depot in Johannesburg.

Rand: The St. Elmo mine has seventeen men at work and has shipped 115 tons of ore since February 15th.

Madera.

(Special Correspondence).—The bar at the junction of Fine Gold and Crystal Falls creeks, near Central station, has been bonded for thirty days to McKensie & Fletcher of Fresno for $2500. A thorough prospect of the ground will be made, and, if the result justifies it, a 300-foot race will be cut which will drain the bar to bedrock.

A ton of average rock has been sent to the smelter from the Starbuck mine to test the percentage and value of the sulphurets. If the returns are satisfactory, a concentrator will be added to the mill. M. Williams is Supt.

A San Francisco man has concluded an examination of the Magnet lode near Central station. He reports the vein to be a true fissure contact between a composite Genesee granite on the hanging-wall and stratified porphyritic granite and talcose slate on the footwall. He found the vein regular throughout the length of eight locations with a width of 3 to 5 feet of quartz, which carried at all points, where opened, free gold and sulphurets in paying quantities. The discovery of tellurides at several points on this lode has created interest in this locality. Prospecting upon the lode is being actively pushed.

Gold, March 7th, '98.

Mariposa.

(Special Correspondence).—Doty, Pascoe & Ten Eyck, who recently leased the Louisiana mine, have started up the mill again and are well satisfied with results thus far.

The Red Banks and Crown Lead properties, which were closed down entirely a few weeks since, are to be started again about March 10th with twenty men. It is reported that the properties have been taken over by the London interests which have held the bonds on them for the past year.

The Virginia mill is running and with satisfactory results.

Hilliard & Hedges expect to have the Compromise mill running about March 15th, adding another to Mariposa's bullion producers. A new and very promising vein has been opened, showing 4 feet of quartz carrying some $10 in free gold and about 5 per cent of sulphurets. The 10-stamp mill has been overhauled and is about ready to start. The mine has a long record as a producer of high-grade ore in the past, but has been idle for fifteen years. The first mill on this property is generally conceded to have been the first stamp mill in California.

Negotiations are pending for the reopening of the old Hasloe mine on Gentry's gulch. The mine at one time was considered one of the richest in the State, but has been idle for more than ten years.

Mariposa, March 8th, '98.

Mono.

(Special Correspondence) —There are but 8 inches of snow in this locality, and water will consequently be scarce Because of present water famine and freezing weather, the Jackson & Lakeview Co.'s mill has been temporarily closed. Dead work, that has long been a necessity, is being done in the meantime. The company, during its many years of operations, has never experienced such a dearth of water as now exists.

The Standard has hung up its stamps temporarily, but is using steam for hoisting.

Lundy, March 6th, '98.

Nevada.

(Special Correspondence).—Almost a year ago San Francisco parties took up the old Diamond mine, within a mile of Grass Valley, a property abandoned years ago. The company cleaned and retimbered the old shaft, erected necessary buildings and vigorously pushed development. The company has in a measure been encouraged by the finding of an ore body that promises well in size and quality. Assays show a high grade of ore. The company contemplate building a 5-stamp mill at once. The president of the company is A. C. Widber, city and county treasurer of San Francisco.

Grass Valley, March 8th, '98.

(Special Correspondence).—The Mayflower mine near this city, owned by W. H. Martin, was bonded recently to P. Etchebarm of San Francisco for $120,000.

The property has extensive underground work and is provided with a 20-stamp mill and other machinery.

Nevada City, March 7th, '98.

On the Tom Boy and Hitchcock mines near Round mountain a new ledge was discovered which is of good size and shows some free gold.

The Kentuck mine near Grass Valley has suspended operations temporarily.

The *Union* says that work will be begun on the Normandie mine, near Grass Valley, and also states that the Golden Gate mine, near Grass Valley, will begin development work at once.

P. Curnow has struck a ledge in his mine near Columbia Hill, the extent of which has not been determined. A drift has been run 27 feet in the quartz and there is no indication of a foot wall. The ore yields a fair prospect.

The unwatering of the Phœnix mine has been completed, and the task of cleaning up the drifts, winzes, etc., is well started.

Placer.

(Special Correspondence).—Work will be resumed on the Lost Emigrant mine, sixteen miles south of Summit, so soon as the snow disappears. The property is owned principally by F. L. Heath, E. Doolittle and S. W. Jacobs of Summit. A shaft has been sunk 75 feet on a ledge varying from 18 inches to 8 feet. Mill tests have yielded as high as $75 per ton. The company will build a 5-stamp mill.

Summit, March 5th, '98.

The Eureka gravel mine near Forest Hill during February, with two shifts, ran 223 feet of bedrock tunnel. The tunnel is in 2455 feet.

The last clean-up at the Bellevue, Ophir, twelve tons, was 149 ounces of bullion.

Plumas.

Operations are active at the Plumas Imperial.

Eaton & Wilson have driven a tunnel on bedrock 107 feet through a deposit of gravel at Rich Bar that prospects fairly well, the deposit varying in depth from 1 to 6 feet.

The Claybank Co. is running the main tunnel at a rapid rate.

Riverside.

Near Perris there are five mills in operation—the Good Hope, 20 stamps; Virginia Queen, 5 stamps; Santa Rosa, 20 stamps; Riverside G. Co., 10 stamps; Santa Fe, 5 stamps.

San Diego.

The Signal Hill group of twenty-six claims will be further developed. Shafts have been sunk and drifts run to determine that the deposits of ore are large, though probably low grade.

Shasta.

T. F. McAvoy secured an option on the Lyons mine on Rich gulch for Chicago capitalists.

Sierra.

The Rising Sun mine is about to start up.

The Sierra Buttes has closed temporarily to replace machinery.

The Downieville *Messenger* says that the insurance Co. will build a new mill and replace the buildings destroyed by fire at the Young America mine last summer.

Dr. King of Salt Lake and E Lewis, interested in a quartz property near Downieville, contemplate putting a mill on the property.

The Mexican is making a test crushing at the Gold Bluff mill.

The Grass Valley *Union* states that the Plumbago mine is in rich rock again and in a few days $16,000 was taken out. One piece, which weighs less than 100 pounds, is estimated at $10,000. The mine is owned by the Crœsus G. M. Co. of New York. It was bought three years ago and since that time nearly $300,000 has been extracted, mostly from specimen ore.

Siskiyou.

The Salt Lake *Tribune* says that E. H. Alris of the Mercur M. Co. returned from California, and quotes him saying it was impossible to overlook the fact that greater interest is being taken in the mining camps of California than at any time since the boom of early days. With Mr. Dern and others he has interested himself in Siskiyou county.

The Ætna *Ideamer* says that ninety-five tons of ore at the Ball mine yielded $15 per ton.

Journal: While the dry season has made gulch and placer mining an impossibility in many localities, the river mines have had an uninterrupted season. On the Klamath the Buckeye Bar placer mine has been worked during the past winter, something they have been unable to do when the water was plentiful.

C Jensen is working his hydraulic mine on McKinney creek, and will soon be ready to make a clean-up C. Parker & Co., farther down the creek, have their hydraulic plant started. At the mouth of McKinney creek Jackson & Crary are working upon pay gravel.

The Distlehorst & Barton dredger, in operation on the Klamath river, near Oak Bar, is taking out pay gravel.

J. Pedibodou sold a claim at Scott Bar for $4000.

News: P. C. Lang & Bro. have started their hydraulic on Barkhouse.

Osmond, Phelps & Co have started drifting near Oak Bar, owing to the water supply being insufficient to operate their hydraulic plant.

H. J. Barton is building a dam on an island of the Klamath at Oak Bar, which will drain the river bed, 1200 feet long by 150 feet wide.

Work has begun on the Jubilee mine at Humbug by a San Francisco company. W. F. Shurtliff is Supt.

Trinity.

Eighteen tons of high grade ore at the Lappin mine, near Deadwood, are ready for shipment. Ore of a free gold character is run through an arrastra. A tunnel is being driven to catch the veins at depth.

On the Gruss and Turner mine development work is being done and the property is assuming the appearance of a mine

At the Willey mines considerable good ore is on the dumps.

Zent & Thorne are taking out fair rock from their workings. By arrastra it yields about $10 per ton.

The *Journal* says that a company is being organized at Trinity Center with a capital of $250,000 to work the channel of the Trinity river, for a distance of ten miles, by P. McDonald, P. Holland, Bragdon Bros., Moore & Withem.

Phillips & Nordose have a placer claim near Trinity Center, and will soon have the latest improved machine at work.

The strike at the La Grange mine has been declared off. Unable to induce the employes of the mine at Junction City to join in the strike, the fight has been abandoned.

Redding *Searchlight*: Ruggles & Peterson, above Trinity Center, have struck a good ledge of $14 rock. The Bloss & McClary hydraulic, under the new ownership, is running day and night.

Crowe Bros. are making a good run on their placers and also have a crew at work on a quartz property.

Maynard & Demock have discovered a ledge of gold and copper bearing rock on Copper creek. The ledge is 35 feet wide.

W. Vollmers has made a good ore discovery on Squirrel gulch near Trinity Center.

Tuolumne.

(Special Correspondence).—Work on the Bell mine, which is a new prospect, is being prosecuted vigorously and with very satisfactory results. The shaft has reached 350 feet. Crosscutting is being done on the 300 level. The ore value runs high, more so than the owners at present care to disclose. The work is carried on by San Francisco bankers and Geo. Blake, who is also Supt. The mine will be among the steady producers of Tuolumne county. A mill will no doubt soon be erected.

Tuttletown, March 7th, '98.

J. P. E. Heintz of San Francisco has bought the Eberhardt property, near Jamestown.

At the old Oakland mine W. Butterfield is getting the 5-stamp mill ready for starting.

The Sonora *Democrat* says that J. T. Newcomer has struck a good vein on the Snell group at American Camp.

The 10-stamp mill at the Arbona started last week.

The Dead Horse has struck good ore below the 1400-foot level.

The tunnel at the La Estrella is in 250 feet.

In the U. S. Circuit Court Judge Colt, in the case of G. M. Pinney vs. Wm. A. Nevills et al, dismissed the case and discharged the trustee on account of lack of jurisdiction. This is the suit brought against Nevills et al, officers of the Rawhide G. M. Co. The plaintiff acted as agent for the company in Boston, and alleged that he was authorized to dispose of its entire capital stock. Chas. W Norton agreed to purchase the stock at $15 per share, for which plaintiff's commission was to be $75,000 The company refused to allow the sale, and it was sued for $100,000 on an action of contract. The stock had been deposited in the National Bank of the Republic, and it was then attached by the plaintiff The defendants requested a transfer to the U. S. Circuit Court. Afterwards they asked dismissal of the case on the ground that property of a foreign corporation, owned by non-residents, could not be attached. The bank also asked to be discharged as trustee. Both motions were allowed.

Yuba.

Transcript: The operations of the U. S.

Debris Commission at Smartsville have been abandoned until the water gets lower.

The Marysville *Appeal* says the Webb M. Co. have added thirty men to their force at Browns Valley, and will sink the shaft on the Pennsylvania 400 feet deeper.

NEVADA.

The lower tunnel of the Corieux mine, near Mountain City, has cut the ledge, and an upraise has been started to connect with the upper workings for air.

The Bray and Bell mines at Ione, Nye county, owned by the Ione M. Co., are said to have been sold to the Nevada M. Co. for $150,000. The Nevada M. Co. has been operating at Austin for some years, and it owns the Nevada Central Railway, which runs from Battle Mountain to Austin. Sheriff Easton of Lander county says there are more men in the Ione mines than there were in Nye county two years ago.

At the Summit mine, near Pioche, enough ore is blocked out to keep the mill running for the next ten months at its present capacity, which is about thirty-five tons per day. The mill and mine employ forty men.

The April Fool mine, at De Lamar, is putting through twenty tons of ore daily of an average value of $25 gold per ton.

The Ione M. Co., at Ione, is employing 100 men and milling the gold values out of forty tons a day. The shaft has a depth of 300 feet.

The Nelson M. Co. is sacking good ore from the Charley Ross mine.

Work was begun on the Zirn placer mine, near Genoa. The dirt will be hauled a mile to be washed.

Parsons & Davis at Silver City, says the Dayton *Times*, will put in a crushing plant to handle from forty to fifty tons of ore per day. There is considerable low grade ore on the dumps of the Silver City mines.

The Salmon M & S. Co. shipped two tons of copper bullion.

OREGON.

(Special Correspondence).—Referring to an item that appeared in last week's issue of the MINING AND SCIENTIFIC PRESS concerning a group of properties near Cornucopia, I am enabled to give you some particulars of the transaction, which is of some magnitude. The extensive development to be carried out on the various claims and the subsequent placing of a large machinery plant will add considerably to mining interests in general and to this section particularly.

The purchase, under a bond, was made by A. B. Bement of Terre Haute, Indiana, who has given much time to thorough investigation of the locality. The properties are the Red Boy and extension and the Mountain Chief and extension, for $16,000; Queen of the West and three extensions, $16,000; May Queen, $4000; Omaha, $4000; Allen, $6000; Poorman, $8000; White Elephant and Jumbo, $10,000.

Upon this price a payment of 10 per cent is to be made Nov. 1st, '98. A 10-stamp mill is to be erected at once for prospecting purposes. Mr. Bement is expected to return shortly from the East and will, I am informed, take personal charge of the general management.

Baker City, March 8th, '98.

The Baker City *Democrat* says that the Bonanza M. Co. will add a mill of 100 stamps to the present 20-stamp mill, which will be moved to Bennett creek.

Keith & Bamberger will build a mill on La Bellevue mine at once.

The Baker City *Democrat* says that capitalists of Hanover, Pennsylvania, purchased the Denny group, sixteen miles from Baker City, and have begun extensive development work. D. W. Nelson is Supt.

The Baker City *Democrat* reports the clean-up at the Red Boy for last month to be $10,000.

In Baker City, a one-half interest in the Gordon Con. placer claim on Gimlet creek was transferred to D. C. Miller. The property is equipped with a good hydraulic plant. Last year a nugget weighing $493 was taken from this ground. Operations will be carried on night and day while the season lasts.

The Helena mine at Seven Devils has ceased operations for a short time.

Riggs & Bacon have discovered a vein of quartz near Woodville, 18 inches wide, which prospects well in free gold.

The Jewell Hardware Co. of Grants Pass bought during February gold dust to the amount of $7404.

Jones & Co. near Grants Pass struck a ledge which shows 18 inches of good ore.

Good ore is being taken out of the Big Mountain mine at Missouri Flat. The ore carries gold, lead, iron and silver.

The Rock Gulch hydraulic mine at Galice creek produced $600 in five days run.

The ledge at the Columbia mine near Baker City has been crosscut and ore exposed, which is satisfactory to the management.

The Baker City *Republican* says that I. Guker at Canyon City took a nugget out of his claim last week that weighed $790.

Development in the Ashland & Mattern group is progressing steadily, thirty men being employed.

The width of the ledge in the Peacock mine at Seven Devils is 102 feet and will average 22 per cent copper.

The strike in the E. & E. mine near Baker City is said to be 8 feet of free milling ore at a depth of 500 feet.

J. R. Farrell, for J. E Searles of New York, has applied at the La Grande land office for patents for the Motor and Gore claims near Sparta. Their development will be pushed rapidly.

WASHINGTON.

The Trilby group near Ellensburg has been sold to Philadelphia people for $10,000 cash.

The net return on eleven and a half tons of ore shipped to the smelter by the Gladstone group on Silver creek was $31.20 per ton. The ore ran in lead 66.7 per cent.

The Bonanza mine, four miles from Bossburg, has struck ore that runs from 30 to 40 per cent lead and from ten to fifteen ounces silver. The mine has been operated and shipping more or less for the past seven years. The body of ore is 300 feet long and from 5 to 30 feet in width, with 100 feet of stoping. Supt. Hanley estimates that there is sufficient ore in sight to ship three carloads a day for a year. The company will sink another 100 feet, and put in heavier machinery for the more rapid development of the property.

The Conquest mine, between Usk and Newport, is shipping ore.

Work has begun on the Penciltuck mine, near Box canyon.

Brown & La Claire struck gray copper ore near Usk.

The Columbia Placer M. Co. at Wenatchee is taking out $35 a day.

The Comstock-La Fleur Co. has started ten men to work near Nelson. The company will put in machinery in a short time and work the mine extensively. The ore is copper, said to run 40 per cent besides $60 in gold.

BRITISH COLUMBIA.

The Canadian Pacific railway has contracted with the War Eagle mine for the shipment and treatment of 100 tons of ore daily for one year. The freight and treatment charge is $7.50 per ton, a reduction of $3.50 below the rates which have existed.

P. C. Stoess has taken a bond on the Lone Star and Spotted Horse, near Ymir, for $20,000.

Ferguson & Coldwell of Kaslo have given an English company an option of $7,000 on the Carbonates on Spring creek. It is probable that a concentrator will be built by the purchasing company in the spring.

T. A. Garland, for a Manitoba company, has taken a bond in the sum of $10,000 on the Falcon mine, near Central Camp. Five per cent was paid in cash and the balance is to come in equal installments at six and twelve months.

The Brooklyn mine, in Greenwood Camp, has been bonded by J. E. Boss for $50,000, paying 10 per cent cash and the deferred payments to be made in equal installments every sixty days.

A representative of the Omaha & Grant Smelter Co. denies that his company is about to withdraw from the Kootenay. He says the company still owns the Pilot Bay plant and other mining interests and the suspension of operations is but temporary. It is thought, however, that the resumption of work is contingent upon the action of the Dominion Parliament in raising the import duty on lead products.

On the Rooney and Lucky Jim, near Salmo, there is a 3-foot ledge, furnishing free-milling ore assaying from $3 to $9. Both claims carry gold, silver and copper, averaging $3 in gold, 4 per cent copper and ten ounces in silver.

The Mollie Hughes group, near New Denver, was sold to an English company for $40,000.

John B. Hobson, Mgr. Con. Cariboo hydraulic mine, near Ashcroft, who is in San Francisco, says: "Twenty-one cubic yards of gravel were washed through small sluices charged with quicksilver in the usual way. The gold recovered therefrom after retorting weighed 236 grains, valued at $8 26, making an average of 39 3-10 cents per cubic yard, which, added to the product of samples taken in '96, as follows; from shaft No. 1, 27.6 cents; shaft No. 2, 50.6 cents, '97; from face of bank No. 3, 99 cents; face of bank No. 4, 36.3 cents; making the average of the four tests of gravel of the bottom bench yield 54 1-10 cents per cubic yard.

ALASKA.

The Bald Eagle at Sumdum, consisting of five claims, is working the ore from a depth of 400 feet. Every Alki takes south a large quantity of concentrates.

At the Sumdum Chief the 10-stamp mill is crushing twenty-five tons of ore every day.

At the Belmont group, near Sumdum, work has been pushed all winter. The ledge is 300 feet wide. The ore averages $5 per ton in silver, gold and copper. It is probable that a 40-stamp mill will be erected on this property next summer. There is a mill site and plenty of water for power.

The Don Carlos has been bonded and work will commence in the spring.

The Cumberland, owned by the Alaska G. M. & T. Co., has made arrangements for tunneling, drifting and sinking.

The Illinois, Kentucky & Washington group, near Sumdum, all show up well so far as development work has progressed. They are owned by the North American M. & M. Co.

Across Endicott arm, four miles from Sumdum, is the Portland group. The property is developed by shafts and open cuts and good ore is in sight. The mountain is timbered with yellow cedar.

THE KLONDIKE.

Eleven men from Dawson reached Seattle last Wednesday. They had $40,000 in gold and $100,000 in drafts. They left Dawson Feb. 7th and report the discovery of placer grounds on Walsh creek, a short distance down the Yukon from the Big Salmon river. Prospective Klondikers, who were caught in the ice at the mouth of this river and were compelled to winter there, made the strike. They were compelled to go into winter quarters, and put in the time prospecting the streams in the neighborhood. Nothing of value was found until the new creek was tried. The first dirt panned ran 35 cents to the pan and from that up to 75 cents. Thirty-two men had located claims up to Feb. 21st. These claims are the regulation 100 feet. The creek runs back from the Yukon about twenty miles.

Speaking of the scurvy epidemic at Dawson, one of the returning passengers says: "When we left Dawson there were between twenty and thirty cases of scurvy there. There is no need of anyone at Dawson getting the scurvy. After a few years in the interior country, men get careless as to the variety and preparation of their food. Some of the old Yukoners have been living on little else this winter than bacon, beans and bread. They cook them in a hurry and in very unclean fashion. They don't seem to care for a variety of food. They could get it if they wanted it. The old Yukoners are the chief sufferers. A very few of the new comers are sick. They are full of life and work hard, while the old-timers lie around their cabins and do no more work than enough to keep them in bacon and beans."

In speaking of the food question, he said he had expected to stay in the country all winter and stocked up well with supplies, and when he sold his supply before coming out lost heavily. He bought three sacks of flour in the fall for $800; before leaving he sold two sacks for $90, and had hard work to find a buyer; a case of desiccated potatoes sold for $30—just what he paid for it after the boat arrived in the summer. Canned goods, for which he paid $1.50 a can, went begging at $1. At the stores you can get butter, milk, etc., in small quantities, at summer prices.

The returning Klondikers report the trip up the river a hard one, and all had difficulty getting past Thirty Mile creek. Several were slightly frozen.

A considerable exodus had set in from Dawson to Rosebud creek, about fifty miles above Dawson and four miles from Sixty Mile creek. The story that caused the excitement early in January was that a party prospecting on the Upper Yukon found gold from the start on Rosebud creek. They are said to have taken out dirt that ran from $4 to $10 a pan. The news spread, and already a number of claims have been staked and cabins built on Rosebud.

The Seattle, Wash., *Times* of the 5th inst. makes prominent this announcement: "Out of the number of steamers which have departed from Seattle to northern ports since he 1st of August, '97, five have been wrecked and nearly one hundred lives have gone out because of these disasters."

A recent returner from Skaguay says: "When I left Skaguay between fifteen and twenty had died of spinal meningitis and several others were sick. I did not hear of a single case that recovered. It is invariably fatal and lasts from three to nine days. The disease is infectous but not contagious. There are also several people there suffering from la grippe. The condition of affairs is appalling. The cause of the sickness is due to a stratum of air that comes down from the mountains and meets the mist and milder air that comes out from the gulches. The effect produces a chill, and may be more accurately described by saying that it is like rushing, in about five minutes, from an extreme cold to a milder climate. The Indians will not live in Skaguay in the winter. Many cases reported as being frozen to death died from cerebro spinal meningitis. There are between 3000 and 4000 dead horses lying within a radius of twelve miles of the town, and when warmer weather sets in no one can foretell the disasters that may result from the decomposition of these carcasses. One noticeable feature of the town is the listless condition of the people. They sit around in their cabins and in the hotels and boarding houses without hope or ambition, their state of mind, no doubt, being produced by the sickness now ravaging the town. Yet people will not stay away from there; the prospect of becoming rich draws them, magnet-like, thither. On one day, returning, we passed ten crafts, all crowded with freight and passengers. They are flocking in there in all conceivable kinds of vessels—scows, barges, sailing boats—anything that will transport them to the country. It would be a blessing and a philanthropic act if some one could stop the frantic rush and induce the people to stay away."

IDAHO.

A strike was made last week on the Jackson, six miles above Murray. The lead is 14 feet wide. Five feet of this is galena, the balance being good concentrating ore.

Press dispatches state that the report has become current that the Hunter at Mullan will commence rebuilding its mill at an early date; also that a new flume will be put up and a shaft started.

The Hi-Yu mine in the Florence district passed into control of an Eastern company under a bond of $60,000, payable in sixty days. A cash payment, said to be $10,000, has been made. The ore runs from $10 to $16 a ton in gold. The new company, it is reported, will put more men to work and will increase the capacity of the mill with five or ten more stamps.

C. H. Oliver of New York has bought the Horseshoe placer mine near Lewiston for $80,000.

The Sadie Ann and Eagle claims, about four miles from Warren, have four distinct ledges. The middle ledge of the Sadie A. has a shaft to a depth of 37 feet. At the surface of the ledge there was a pay streak 4 inches wide, which has widened to 16 inches. The pay streak is ribbon quartz. This spring the company will put in a pumping plant. A tunnel is in 92 feet and has struck the ledge at a depth of 175 feet. There are four different pay streaks in the ledge from 2 to 8 inches wide. Jas. Wilson is Supt.

The Rescue, near Warren, has paid its owners $110,000. There is about 3000 feet of work done on the property and the depth attained is 200 feet.

The Goodenough, owned by the Idaho Con. Co., C. Czesic Mgr., has an upraise shaft 275 feet deep, with a 400-foot tunnel. The company in their first run of three weeks from a 5-stamp mill cleaned up $8000.

The Iola, near Warren, owned by the Honest John M. Co., Capt. Moore Mgr., has about 2300 feet of tunnel and drift work.

UTAH.

In the Cannon group at Mercur a strike was made of the ore that shows an average in the breast of the drift of $8 a ton.

The Galena made its first shipment out of Beaver Lake last week and is hoisting ore for another, and putting down the main shaft to greater depth.

At Minersville L. Lessing made a shipment from the Cave mine, from which he derived good results.

The Grand Central at Mammoth is putting out a carload a day, but no attempt is made to crowd shipments.

The Galena of Beaver Lake has been added to the list of producing mines. The vein is from 6 to 18 inches in width.

Tribune: During 1897 the Horn Silver marketed crude ore and concentrates of the value of $244,263.39, paid a dividend of $20,000 and closed with a cash balance in the bank of $136,889.72, in addition to "call loans" amounting to $53,000. The cost of extracting the ores was $4.09 per ton, and the cost of concentration, in which four and a half tons of crude ore were reduced to one ton of concentrates, $1.25, or $5.34 per ton when ready for the market. The average value of concentrates was $20.98, that of the shipping ore $16.70.

The Mayflower group, near Bingham, has driven 100 feet on the vein, and in a crosscut has uncovered an oxide of iron, samples from which show an average of about $9 per ton gold.

The output of the Mammoth mine the past week was 400 tons of high-grade ore and seven carloads of concentrates.

The Grand Central at Mammoth averages an output of thirty-five tons a day, showing an average of 30 per cent lead, 40 ounces silver and $15 in gold.

J. W. Green announces an 8-foot vein in the Pacific shaft at Eureka at a depth of 60 feet, with a 6-inch pay streak showing values of 139 ounces silver, $14 gold and 39 per cent lead.

A new strike is reported in the International mine in west Tintic, showing 30 per cent lead, 2 ounces silver and $1 in gold.

At the Highland Boy, at Bingham, in February, 1500 tons of crude ore were put through the mill, while 950 tons went upon the market. The shipping ore showed a valuation of 11 per cent copper and nearly $5 in gold, the gold values running up at times to as much as $20 per ton.

Mercury: The ore body at the Geyser-Marion, Mercur, has increased to 37 feet between walls. The ore averages from $3.25 to $4.50 per ton and is furnishing thirty-five tons of ore daily.

The Sacramento made its semi-monthly shipment of cyanides last week. The mill is running entirely on oxidized ores.

The second lot of concentrates from the Red Wing, at Bingham, has reached the sampler. The Red Wing is one of the new properties added to Bingham's producers during the year.

The output of the Bullion-Beck for the ten months it was in operation in '97 consisted of 19,932 tons of crude ore, of a valuation of $597,192.04, and 2492 tons of concentrates, of the value of $39,161.85; a total of $636,353.89. The mine is putting out about 1800 tons per month. Since resuming work in December new ore bodies have been encountered.

The last clean-up at the Mercur was $20,000 in gold cyanides.

MONTANA.

The receipts from the sale of bullion and ore in 1897 from the Alice G. & S. M. Co. at Walkerville amounted to $559,474 47; dividends amounting to $60,000 were distributed, and on January 1st the company had a cash balance of $25,116.17. The company has paid total dividends amounting to $1,055,000.

The Culipper in Granite Co. has become the property of the company controlling the Golden Sceptre mine. The mine has been idle many years, due more to litigation and the poverty of its owner than anything else. It is stated that the Golden Sceptre people will at once unwater the property, increase the depth of the shaft to 1000 feet and commence ore extraction.

The mill at the Leiter mine near Leiterville, has resumed crushing.

The Sylvanite *Miner* says that the Keystone will build a tramway to succeed its present mill, perhaps a 60-stamp mill, or even greater if the showing in the new tunnel should warrant it, and a cable line, more concentrators and other improvements which go along with a first-class plant on an extensive scale.

The Goldflint and the Keystone at Sylvanite each shipped a carload of concentrates last week.

Silver ore recently shipped from the Big Bonanza near Walkerville ran as high as 125 ounces to the ton.

At the Gold Coin mine near Georgetown, on the 400 level ore was struck running $60 per ton free. Concentrates average $290 per ton.

The Boston & Montana Co., in its suit against the Montana Ore Purchasing Co. for damages for ore alleged to have been unlawfully extracted from the Pennsylvania claim, filed a motion appealing to the Supreme Court of the U. S. against the decision of Judge Knowles in dismissing the suit for want of jurisdiction. The judge some weeks ago sustained the demurrer of the defendants on the ground that no federal question was involved in the trial of the case. The plaintiffs contended that the determination of the suit involved the construction of a U. S. statute.

The matter of the application of the Colusa-Parrot Co. for an injunction to restrain the Anaconda Co. from working within the vertical side lines of the Colusa-Parrot ground was heard by Judge Knowles in chambers. A temporary injunction is granted, by which the defendants will not be allowed to mine inside the vertical sidelines of the Colusa-Parrot.

The Liberty mine, in Barker, from two cars of ore netted $2129. Atkinson Bros. of Neihart own the property.

The Anaconda *Record* says that fifty-two bars of bullion, aggregating $75,000 in silver and gold, were shipped last week by the Anaconda Copper Co.

The Monte Cristo mine in Sheridan made an

re shipment of three tons, and the returns were $121.50 per ton.

SOUTH DAKOTA.

The Portland Con. M. Co.'s property in the Black Hills was sold by the sheriff for $338,-098.42. The property was bid in by H. W. Seaman, as trustee for the bondholders. This sale is in the nature of a reorganization of the corporation, with a view to operating the property on an extensive scale.

Fire last Thursday morning destroyed the Deadwood & Delaware Smelter and a considerable amount of railroad property at Deadwood. Loss about $150,000.

WYOMING.

Press dispatches state that the Hartnell iron mines will be be worked by L. Voorhees of Cheyenne. This will serve to keep several hundred men in employment.

E. P. Snow sold to C. H. Souther, Pres. of the American Dredging Co. of Massachusetts, 640 acres of ground in Albany county. Mr. Souther will work the property with a dredging machine during the coming season.

MICHIGAN.

The annual report of the Tamarack Co. for 1897 shows gross receipts from sales of copper and interest receipts $2,267,340, total costs $1,835,810. The superintendent's report says: "During the year we hoisted 726,665 tons of rock; 60,179 tons were rejected in rockhouses, and the balance, 611,539, stamped; cost of stamping was 26.418 cents per ton; total cost per ton of rock mined, $1.74; total cost per ton of rock stamped, $2 07; mineral obtained for the year, 29,580,380 lbs. The depths of the several shafts, Dec. 31st, '97, were as follows: No. 1 shaft, 3240 feet; No. 2 shaft, 3775 feet; No. 3 shaft, 4526 feet; No. 4 shaft, 4450 feet; No. 5 shaft, 2015 feet."

ONTARIO.

(Special Correspondence).—The Golden Star M. Co. of Ontario have reached a depth of 185 feet in their shaft No. 1, 105 feet north and south from shaft at 75-foot level, 60 feet north and south from the shaft at the 150-foot level. They also have a winze connecting the first and second levels 100 feet from the shaft on the north. Total length of work, 590 feet; average width of vein from surface, measured every 5 feet, 4.8 feet; average assay, $24.47; lowest assay, $11.05; highest assay, $280; 1800 tons on the dump; are going down 400 feet before putting in a mill; are now putting in heavier hoisting machinery; working forty-five men on three eight-hour shifts.

The J. O. 41 G. M. Co.'s property adjoins the Golden Star mine, the vein running across the J. O. 41 property, which consists of 105 acres, well timbered and on the shore of Bad Vermilion lake. They expect to start operations the first of next month.

At the Foley mine work is being pushed in the north shaft, which has reached a depth of 345 feet. The 20-stamp mill is running day and night, turning out gold bricks, a shipment of which was made last week. About forty men are employed.

The shaft at the Olive mine is now 145 feet deep and is showing up a good, strong vein. Assays continue to show large values and the mill runs are very encouraging.

Duluth, Minn., March 4th, '98.

COLORADO.

The Christmas, Cripple Creek, is outputting one carload of ore per day. The greater part of the output is close to five ounces in gold.

The Gold Sovereign shipped fifteen tons of two-ounce ore.

The Legal Tender is shipping sixty tons of ore a day.

Though the Hull City has been doing considerable development work, the output for last week was fifty tons.

The Lucky Gus-Specimen started a seventy-five-ton shipment of $60 ore last week.

The Garfield-Grouse started the first shipment, consisting of seventy-five tons of $80 ore and ten tons estimated at $1500. Nearly 122 men are employed on the property.

The Colorado City is opening a vein of $40 ore.

The last shipment of the Porcupine at Cripple Creek consisted of ten tons; a large portion of the ore ran $400 to the ton.

The Rattler on Raven hill shipped thirty-five tons of $40 average value.

The Enterprise mine at Rico shipped twenty-eight carloads of ore during January and February, '97. For the same months of '98 the output has been fifty-two carloads.

The Tambourine mine at Delphi shipped 100 tons of ore which ran $15 per ton. They also shipped seven tons of second-grade ore which yielded $56 per ton, and 100 pounds of first-class which returned values at the rate of $1260 per ton.

The Centennial at Georgetown shows a pyritic ore 28 inches in width that carries two ounces in gold and twenty ounces in silver to the ton, and 6 or 8 per cent of copper.

The McClurg on the Fluorine at Cripple Creek yielded $27,000 gross in two months.

The Independence at Whitehorn is down 225 feet, with a train load of ore on the dump. Both assays and mill runs on this ore show that it runs from $60 upwards.

The Result at Leadville, which has been shut down for the last two months on account of the small margin between the cost of production and the selling price, has been started up again. The Result usually ships over 3000 tons of iron per month.

The Catalpa is shipping 150 tons of manganese iron per day to the Illinois Steel Works at Chicago.

The C. P. W. property near Black Hawk has been sold to Gunnell & Leslie for $10,000 cash. The main shaft is 120 feet deep. The new owners intend to put up a new plant of machinery and sink as rapidly as possible.

The White Cap at Leadville is producing about 200 tons per month of ore that carries lead and silver with a small percentage of gold.

The San Juan G. M. Co., residents of Milwaukee, will within the next two months erect a large stamp mill on its property in the Gold King district near Telluride. The property consists of fourteen claims, which have been sufficiently developed to warrant the erection of the proposed mill. The main ore body averages $62.50 in gold to the ton, taken across the vein, which is 10 feet wide. The president of the company is C. S. Otjen of Milwaukee.

A carload shipment was made last week by the Pharmacist.

Perkins & Fisher are shipping an average of fifty tons a week from the Pinto, all the ore coming from the 350-foot level.

The Denver *Republican* says the figures for the output of the Cripple Creek district for February show a gain over January, and an increase of more than a quarter of a million dollars over the corresponding month of the previous year. The output for the month was 32,240 tons, at an average value of $65, making a total of $1,149,400, as against $886,000 for the corresponding month last year.

The Freeland adit at Idaho Springs is 2600 feet long, is being cleaned out and the ore in sight will be mined. The upper adit on the Freeland property, known as the Diamond, is in a surface quartz that runs in lead, gold and silver. The shipments are netting about $25 per ton and the streaks are of good size.

The Forfar shaft at Central City is down 300 feet and levels have been commenced at 280 feet. This property is shipping fifteen tons of ore every day.

A small plant of machinery is to be placed on the Gomer claim near Central City, which is being operated for an English company. Nevadaville and Central City men have taken a lease on the Kirk near Nevadaville and will put up a plant of machinery.

All the mills at Idaho Springs are running night and day on local ores. The combined capacity is 1000 tons per day.

The Pharmacist, Cripple Creek, last week marketed forty tons of $100 ore and fifty-five sacks of high-grade rock.

The Modoc produced in February 300 tons of ore running from $50 to $700 per ton. The bulk of it is estimated to run $300 per ton. The company contemplates erecting new machinery to operate to great depth.

At Cripple Creek the Raven's net earnings for February were $15,000.

The Anna J. shipments last week were forty tons of 2½-ounce ore and 100 sacks estimated to run $300 per ton.

The Anchoria-Leland shipped 150 tons of smelting ore.

The Lucky Guss, on Bull, shipped fifty-five tons of $40 ore. Returns on sixty-five tons shipped last week gave $85 per ton.

A new producer has been added to the list near Ouray. Supt. Estie says they have plenty of good ore. A mill will be built on the property.

At the Cleopatra smelter the first forty-five days of this year sixty-four cars of iron ore was used as fluxing and forty cars of lime rock. Twelve cars of matte was shipped to the refinery. During that time 1125 tons of ore was smelted.

The Legal Tender at Cripple Creek sent out 1600 tons of ore in February.

The production of the Specimen for February was 120 tons, average value two ounces.

Returns for a carload of ore from the Zenobia at Cripple Creek netted $3052 20.

The February shipments from the Morse were 196 tons of a gross value of $5213 36.

The O. & N. tunnel at Ouray is in good ore and will average a car a day all through the coming season. The output is gold ore.

Work is progressing on the Hammond tunnel, near Ironton, which is in over 200 feet.

The Revenue continues to send down shipments of high-grade silver ore. It is the heaviest shipper in the camp and about 500 men are on the pay-rolls.

Hinzgen & Hoskins, on the Red Spruce, at Cripple Creek, are operating under a $60,000 bond. The shaft is down 115 feet and has opened a vein of galena which runs 129 ounces in silver and $35 in gold per ton.

The Wedge, at Ouray, as a shipper of high-grade silver, averages a car a day.

Crozier & Williams of the St. Thomas, of Beacon hill, opened an ore body which gives values of $25.60 per ton. There is a streak of black sand accompanying the rock which goes $148 per ton.

The Clara D. has shipped in round numbers $20,000 in the past six months. There is one drift on the property 100 feet in length, exposing for its full length an ore chute averaging 4 feet in width and running an average of about $30 per ton. The Clara D. adjoins the Anchoria-Leland and is owned by the Lexington Co.

NEW MEXICO.

Penn & Moad in the Lone at Red River have their incline down 130 feet and are 7 feet into a new lead of sulphide ore. They intend soon to put in steam hoisting and pumping machinery.

The Silver City reduction works, owned by Mrs. Hearst, are to be increased in capacity and equipped with every modern appliance.

The Red Bandana mine, in Moreno district, has 2500 feet of development work. The vein is large and the ore is said to yield $50 per ton. From ten to twelve tons are crushed daily.

The Santa Rita Copper and Iron Co. is shipping four cars of iron ore per day.

The Simpson Smelter, near Silver City, is running night and day on copper ore from the Hanover mine.

The Copper Queen is turning out gold and silver bullion. Three bricks have been shipped since the mill started.

A sample shipment of two tons of ore from the Western Belle mine gave returns of three ounces per ton in gold.

Herald: The Cochiti G. M. Co. expects to reduce the cost of treating Cochiti ores to $2 a ton.

The work at the Albemarle mine is progressing rapidly. Excavations for the tramway and new 125-ton steel mill is being pushed; seventy men are employed on this work alone. The work in the mine is making the usual good headway. Pipe laying from Peralta canyon to the Albemarle, five and a half miles, will begin shortly.

ARIZONA.

(Special Correspondence).—The new Vulture Mining Co. is in control of the old historic Vulture, sixteen miles southwest of Wickenburg. Between 1863 and 1888 this mine produced about $16,000,000. A great excavation, resembling an immense quarry, marks the place of the old workings. In the earlier years a 50-stamp mill was built near the present site of Wickenburg and the ore hauled from the mine. This old mill was long since moved away, and for the past four years Helm Bros. have operated a cyanide plant on the tailings. The latter handle sixty tons per day.

Before the Wickenburg mill was abandoned an 80-stamp mill was erected at the Vulture mine, much of the machinery in which is still in fair condition. That this mill did service is shown by the acres of tailings on which the new company is now operating a cyanide plant to the extent of ninety tons per day, the product being about $3 per ton. The Vulture appears to have produced a good specimen of free-milling ore down to the 500-foot level, below which there are sulphurets. The hanging wall is a porphyry and the footwall a slate formation. The work from now on will be below the 500-foot level, where a considerable quantity of water is encountered, which will be utilized in milling. In overhauling the old mill and starting it up, which it is the purpose of the company to do, concentrators will be put in, as the ore from now on will be more refractory than formerly. The underground workings of the mine are intact. They hardly show a stick of timber and the management claim it is a mine which needs no timbering. It is claimed the former mill product generally was $18 per ton of ore milled. The cyanide plant, in charge of John F. Johnston, is working with four solution tanks, each 6 feet deep and 26 feet in diameter, and the bed of tailings from the old mill will apparently keep the plant in operation several years. W. C. Davis of Tucson is manager of the new company.

The Eagle group is being developed by Mr. Davis, one mile west of the Vulture.

The Golden M. & M. Co., operating thirty-five miles west of the Vulture, has a 10-stamp mill and a small cyanide plant which will be started to work soon. The members of this company are Chicago and Milwaukee men. The ores are a sulphuret of iron, carrying values in gold.

The Garcia mine is eight miles south of Wickenburg, at which a 10-stamp mill is being erected. The property is owned by people from London, Canada.

Collins is a gold camp forty miles west of Congress. Some good development is reported there by M. L. Grover. This is in the main range of the Harqua Hala mountains, where he says there is an abundance of water and timber. It is about 6000 feet above sea level and is perhaps the least explored of any region of Arizona. WASCOTT.

Wickenburg, Ariz., March 5th, '98.

(Special Correspondence).—Within the past year the Copper Queen at Bisbee has increased the capacity of its smelting plant. There are now four copper blast furnaces, three sets of converters and three Tilton wells in use. By means of the wells, after the slag has been taken off, the valuable material is conveyed directly from the wells to the converters, thus avoiding resmelting. The engine capacity has also been increased. The plant handles about 600 tons of ore per day, from which is produced forty to fifty tons of copper bullion. The Copper Queen Co. is developing new copper mines at a point 108 miles south of Bisbee, in Mexico. The plan is to build a railroad from Bisbee to the new mines if they prove of sufficient value to justify a large plant.

The South Bisbee Mining and Townsite Co. has acquired a large area of ground east of the Copper Queen properties and is doing considerable prospecting work. WASCOTT.

Bisbee, Ariz., Feb. 26th, '98.

(Special Correspondence).—At Harshaw the World's Fair is working with the usual force of men. This is a silver producer.

In Washington Camp the Duquesne has undergone pretty thorough development. The values here are chiefly copper, which is in the form of carbonates near the surface, and a sulphide at the present depth of 350 feet. Much of the ore is strongly zinciferous. Thorough and numerous tests have been made, with the view of choosing a process best adapted to the ore. George Westinghouse owns the property, and reduction works will doubtless be erected on the ground as soon as a conclusion is reached as to the method. In the same locality a mine and concentration mill are being operated by the manager of the Canyon City (Colo.) Zinc-Lead Smelter. The ores are similar to those of the Duquesne and the product is sent to Canyon City.

The Pride of the West, also located in Washington Camp, has shipped 6000 tons of ore. The owner, N. H. Chapin, states that the values have averaged 17 per cent copper, three ounces silver and one-tenth ounce gold. This locality is well supplied with wood and water. It is about twenty miles southeast of Crittenden.

The Commonwealth mine and mill at Pearce, Cochise county, are operated with a force of about 100 men. The ores are free milling and the values are high in gold and silver. The mill is of a German pattern, with balls, vanners and settlers. The very high grade ore is not milled, but is shipped to the smelters. This property is eighteen miles southeast of Cochise and the workings are in a hill which rises 300 feet from a level plateau.

The Middle March is a copper property in Dragoon mountains, eight miles west of Pearce. Development work has resulted so favorably as to make the owners feel justified in erecting a smelter. The machinery for the plant is on the ground and being set up. The Dragoons are the base of considerable development on copper claims. WASCOTT.

Pearce, Ariz., March 2nd, '98.

(Special Correspondence.)—Chas. Davies has the Peery mine and mill leased, near Stanton, and is making a success of the work. The mill has ten stamps and two concentrators. Twenty tons a day are being milled, resulting in saving two-thirds of the values on the plates and the most of remainder in the concentrates; a total saving of $15 per ton.

The Gold King M. and M. Co. have a group of claims on Rich Hill, which they are developing, their tests being made on a prospecting mill. Geo. B. Upton, Supt., says the purpose is to errect a 10-stamp mill.

The Rich Hill Gold Co., owned chiefly by Mr. Hayden of Cincinnati, is developing its properties from a 200-foot shaft. The entire district in the vicinity of Rich Hill produces a gold-bearing sulphuret of lead and iron. The Hayden property contains some antimonial lead, where the formation is a contact between slate and granite. This property is in charge of A. Peterson.

Placer workers and nugget hunters have found Rich Hill a profitable field for the last thirty-five years. Experienced miners are beginning to get a foothold in the district, and with a little capital to help them along their work will soon begin to tell. Stanton and Rich Hill are seven miles from the Santa Fe, Prescott & Phœnix railroad at Congress Junction.

The Fool's Gulch mine and mill remain closed down. The mine is claimed to be a good one, but it is believed a mistake was made as to the construction of the reduction plant, which was built at considerable outlay.

Stanton, March 7th, '98. WASCOTT.

The Congress in doing crosscut work struck a body of ore at the 650-foot level and also on the 500-foot level, and it may be said that they have practically opened a new Congress, bigger and better than the old one. They are working to strike the ore body of the cross-lead at the 1000-foot level.

A. O. Brodie, Gen. Mgr. Crown Point, has made 1990 feet of development work and is down 300 feet. At the 200-foot level a body of ore 4 feet in width was struck and it has continued to the present depth. The assay value is from $109 to $155, nearly all in free gold.

The shaft on the Merrimac, near Chloride, is being sunk rapidly and high-grade ore taken out. A steam hoist will be erected.

The Altata is producing good ore in quantity. There is considerable copper in Altata ore as well as gold and silver.

The Schuylkill mine is producing ore in every place it is worked. Supt. Theis will erect a steam hoist at once.

The Tennessee at Chloride has reached the ore chute and the ore extends the full width of the shaft. The company will at an early day put up a crusher and a number of concentrators.

The Phœnix *Republican* says fifty tons of high grade gold and silver ore is delivered monthly from the Commonwealth at Pearce, to Cochise station. Two shipments of bullion are made monthly. The ore has shown generally $20 gold and $80 silver. Depth reached the 1st of March was 500 feet, considerable drifting and crosscutting being done.

A cyanide plant will soon be put in operation on the Mammoth mine at Goldfield.

A body of shipping ore has been opened up in the Green Linnet mine, Mohave county.

A. W. Warwick, at Bill William Fork, is pushing work on the development of his claim and contemplates erecting a copper smelter.

The Phœnix *Republican* says water has been struck in the King of Arizona mine, in Yuma county, at a depth of 1000 feet, and that there will be sufficient water to supply a 40-stamp mill, which the company will put in at the mine as soon as this is determined. The tailings dump at the present mill site will be worked with cyanide and the tanks moved to the mine when the dump is cleaned up.

MEXICO.

The ore in the winze of the San Felipe mine at Real del Monte is widening and improving in value. Ore is being extracted from two points and development work pushed in three more.

In the Cabrera there has been sunk a winze 25 meters deep in good ore.

The San Miguelito mine in Sonora shipped a carload of silver and copper ore.

The Ibarra mines at Santo Domingo are closed down except for the working of the tailings. A good lead has been struck in the Viznaga mine at Alamo; work will be pushed.

On the line of the Mexican Central the Compani Mineral Penoles employs 3000 men and ships between 700 and 1000 bars of silver, weighing ninety-five pounds each, every day, for shipment to Germany for refining. The company is getting out 1500 tons of ore per week and expect to increase the output to 2000 tons.

At Aguas Calientes they smelt from 500 to 600 tons of ore per day and employ 1000 men. They have seven furnaces and are planning to add three more.

New York and California capitalists have bought the old mining properties of the Parkman estate, in Guanajuato. The company is the Guanajuato M. & M. Co., F. G. Corning of New York president; the Gen. Mgr. is J. Z. Judd of San Francisco, the Supt. and local engineer J. W. Pender, S. B. Connor engineer. There are five mines in the group, and the San Francisco reduction works, the latter having cost $100,000. There is a shaft 16 feet in diameter and 900 feet deep, and the tunnel 5000 feet long. The ore runs from $3 to $10 gold and from twenty to thirty ounces silver. While at present a 20-stamp mill is to be used, power sufficient for an 80-stamp mill is to be set up, and Mr. Judd thinks the full eighty stamps will in about eight or ten months be in operation. The M. P. Boss process is to be employed.

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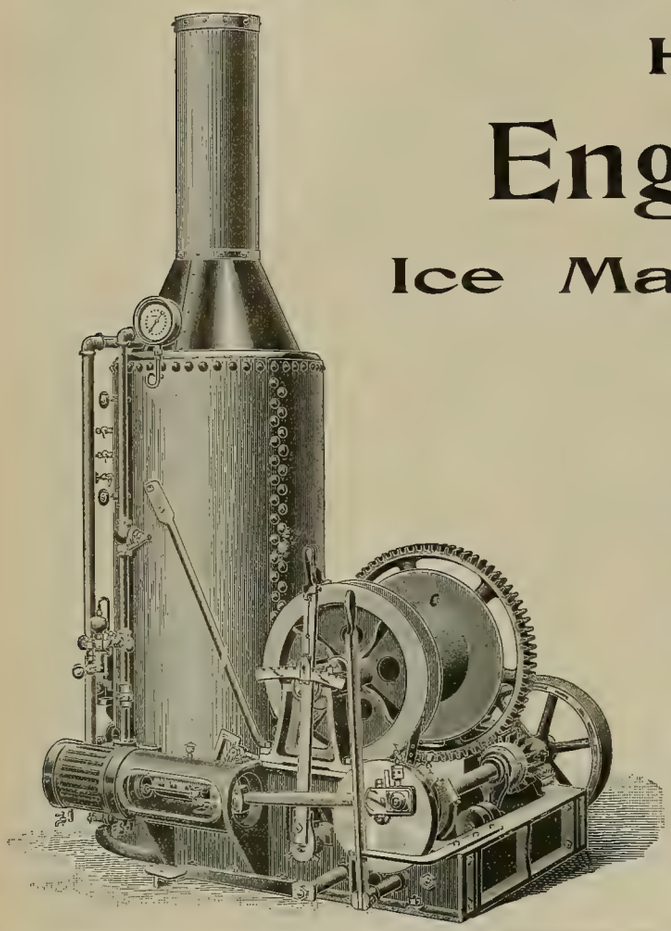
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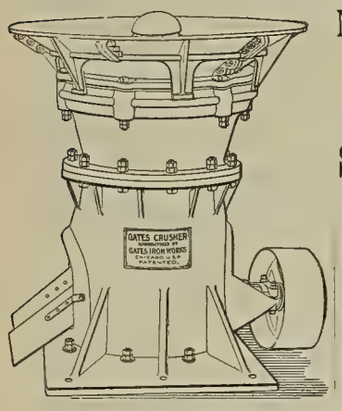
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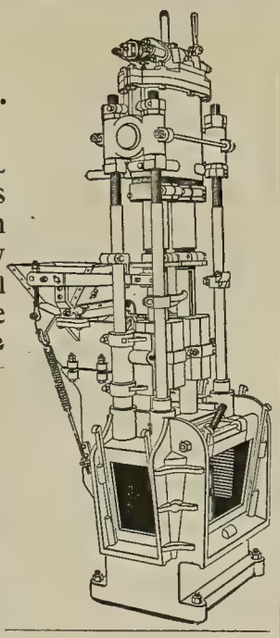
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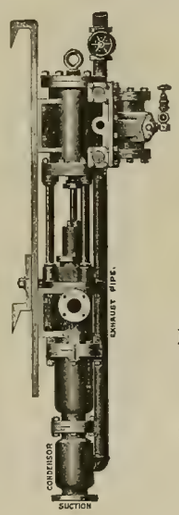
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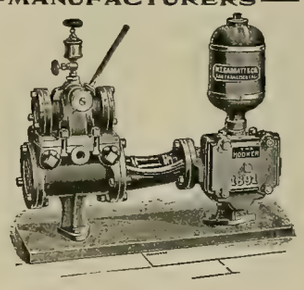
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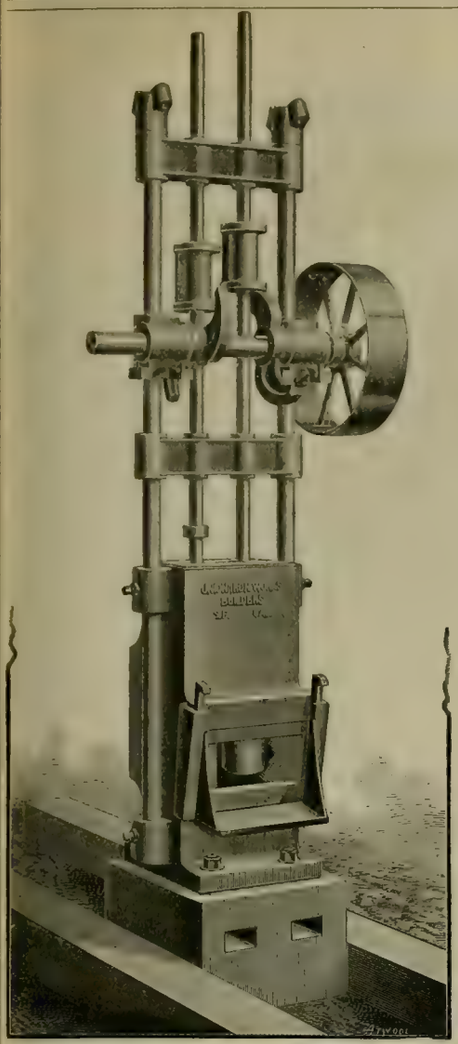
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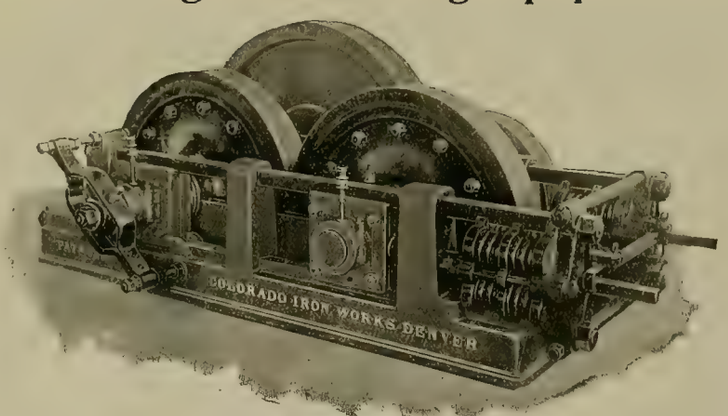
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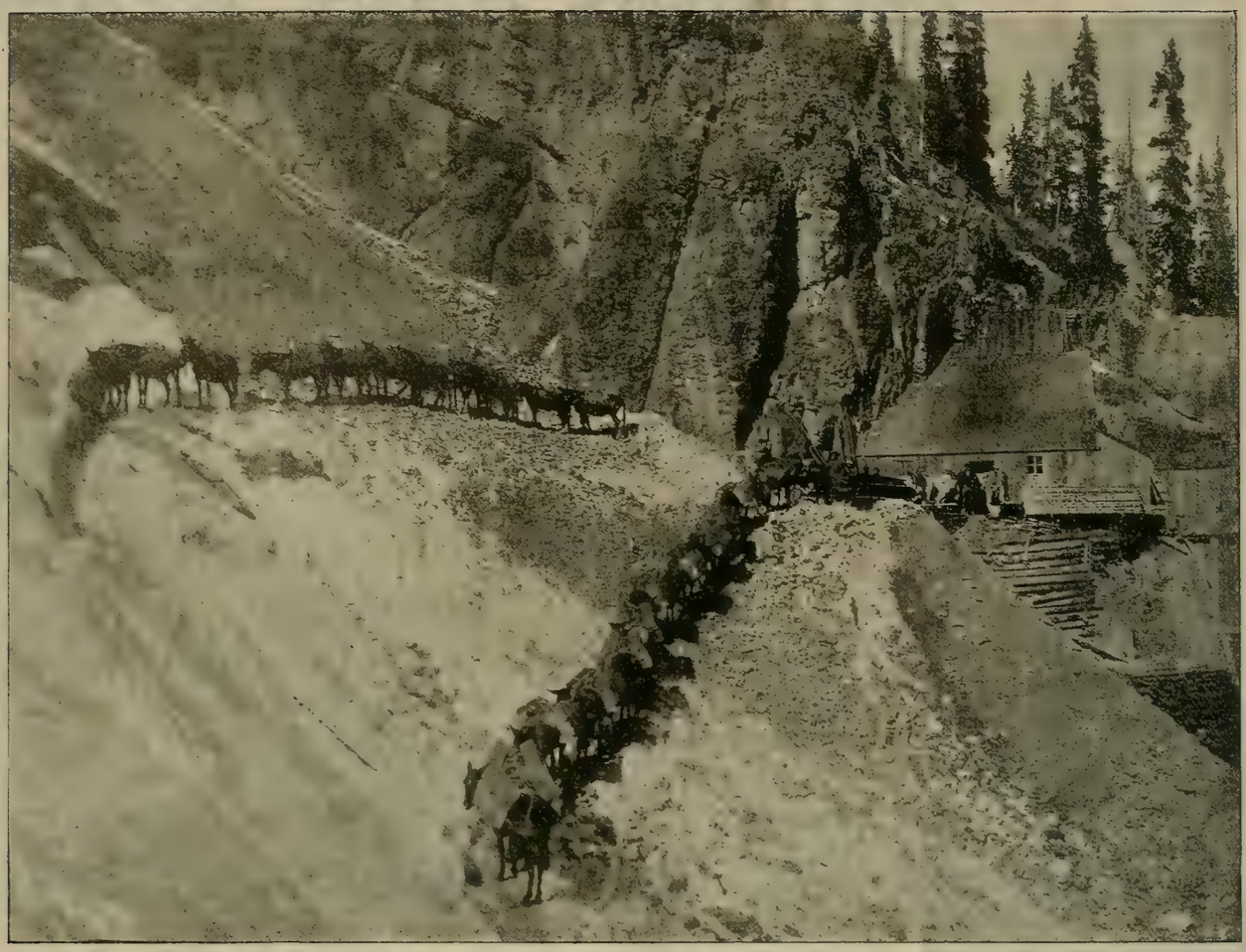
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PACK TRAIN;—NELLIE MINE, TELLURIDE, COLORADO. (See page 281.)

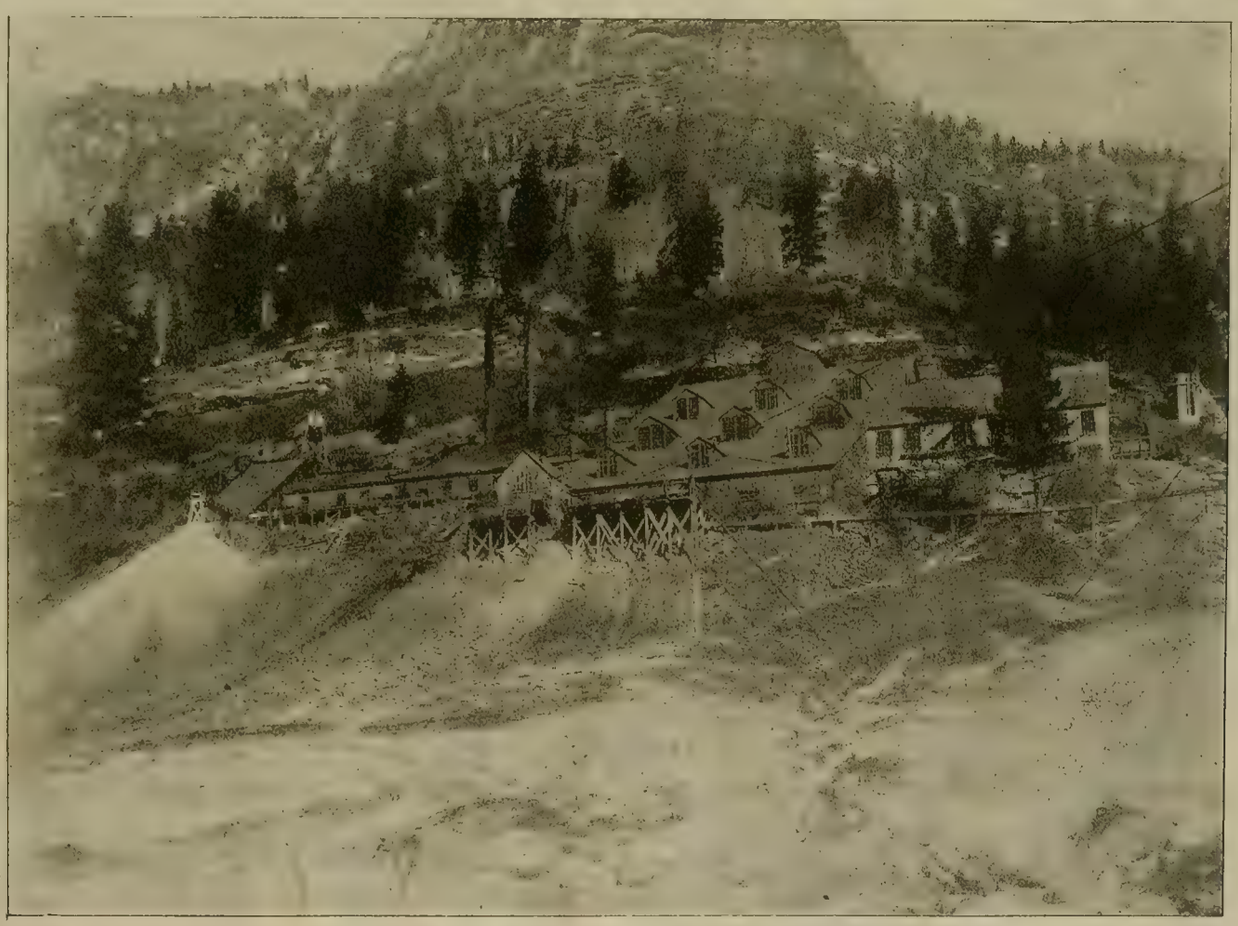
Twelve mules constitute a "string." One string going up is loaded with stulls; the other, unloaded, is returning.



ON THE DENVER AND RIO GRANDE RAILWAY, NEAR TELLURIDE, COLORADO, SHOWING LOOP. (See page 281.)



TELLURIDE, COLORADO. (See page 281.)



SMUGGLER-UNION MILL, PANDORA, COLORADO. (See page 281.)

The tramway between the mill and railroad appears as black lines across the face of the cut.

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Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
1...	2500	2 to 4	25 to 150	150 tons	Single operating plant
2...	5000	2 to 3	50 to 300	200 tons	Duplex operating plant
3...	7500	2 to 2½	75 to 450	300 tons	Triplex operating plant

SWAMP AND RIVER-BED PLANTS.					
Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant	Approximate total weight inclusive of power plants.	
4...	2500	2 to 4	Barge	250 tons	Single amalgamator
5...	5000	2 to 3	Barge	325 tons	Duplex amalgamator

In general terms it may be said these plants consist of the electrically operated dredge and amalgamator, mounted either on steel barges for swamp or river-bed mining, or steel-bodied cars for "gulch," "bar" and "hill diggings," together with the necessary power plants for their operation. Several operating plants, either in close proximity or scattered over a large district, may be operated from a single power station, which may be situated at any convenient point within a radius of a few miles, at railroad depot or where water power can be utilized. The river plants, complete in themselves (each barge containing its own power), are made single or duplex; any suitable number of either can be operated on a river, each independently working its allotted section from surface to bedrock, and rim-rock to rim-rock. All these plants are built with a view to easy transportation, in "knock-down" shape over ordinary mountain roads, and, on special order, the size and weight of separate parts may be still further reduced. In the foregoing table the figure representing the smaller quantity of water required applies to cases where, for any reason, it is desirable or necessary to use the water over and over. The water required may be taken from below the placer, thus obviating the necessity of long ditches, etc. Since these plants neatly pile their debris on the cleaned-up bedrock of the ground worked, they may be said to create their own dump, and hence are enabled to successfully operate on flat ground, or where ordinary dumping facilities are lacking. This peculiarity also renders them independent of "debris laws." The wonderful perfection with which these plants extract the finest, microscopic particles, such as are held in suspension in water, or, when dry, ascend in a gentle current of air, constituting in bulk a perfectly impalpable powder (send for samples), renders them particularly valuable and indispensable in cases where, owing to the fineness of the golden particles, very rich mines are unavailable for profitable working by the hydraulic or sluice processes.

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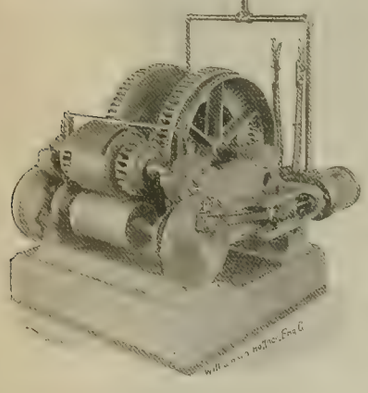
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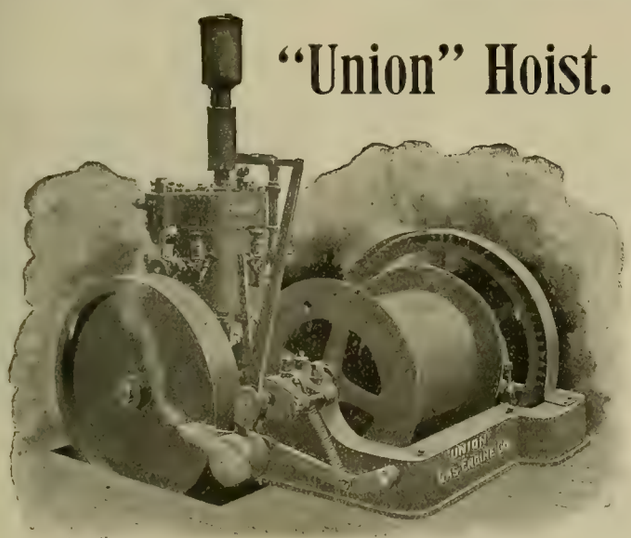
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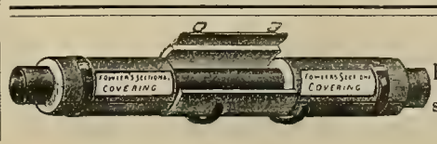
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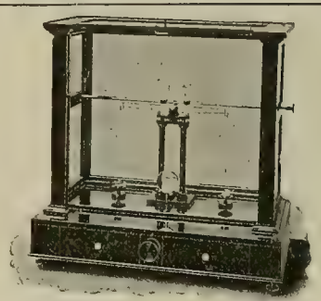
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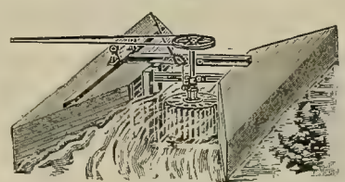
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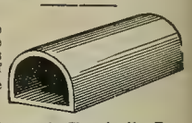
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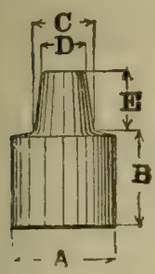


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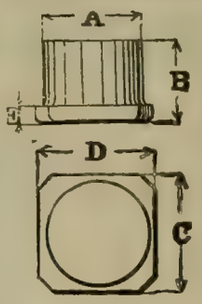
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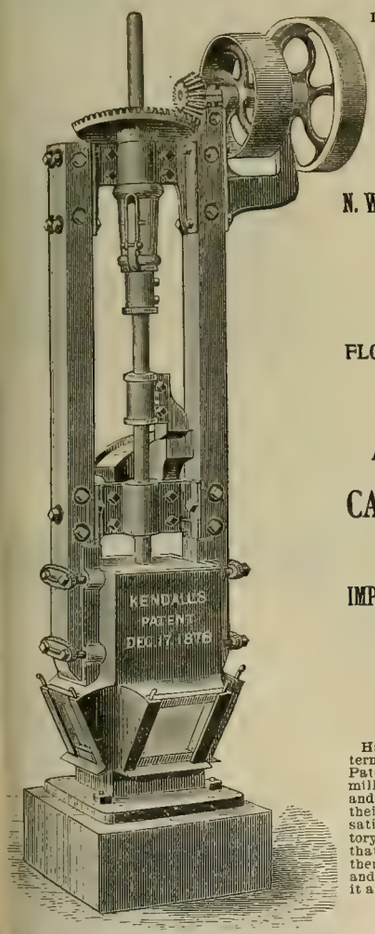
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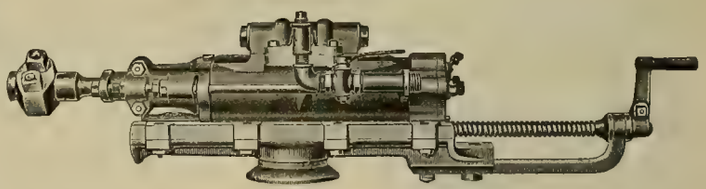
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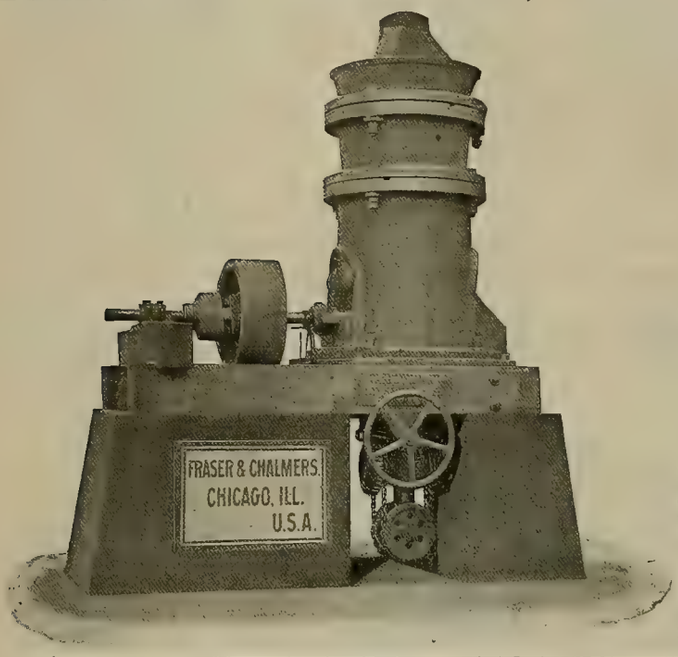
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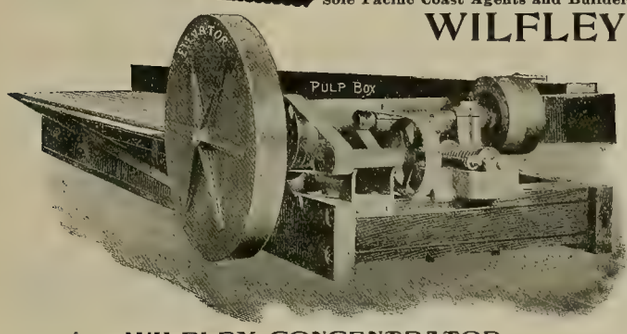
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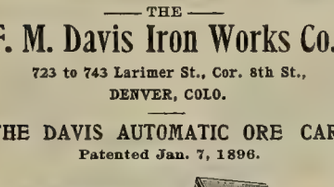
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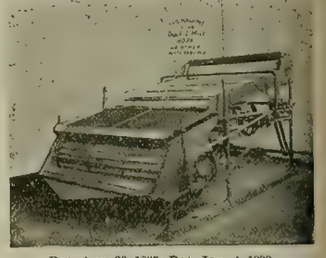
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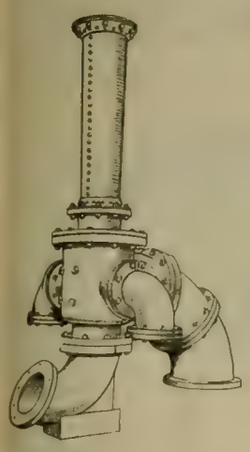
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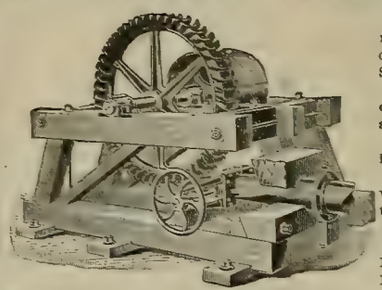


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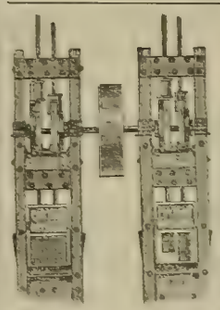
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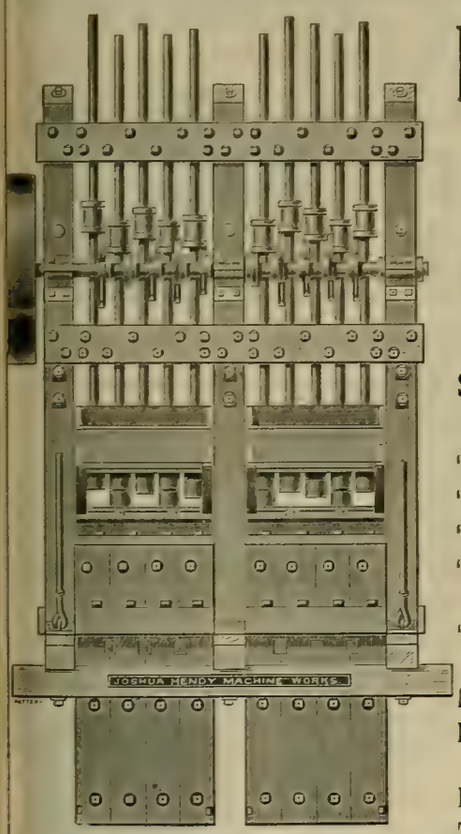
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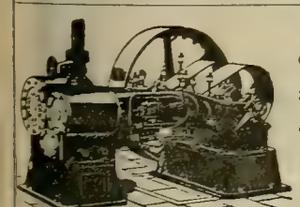
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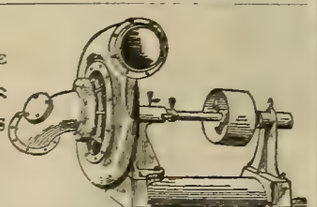
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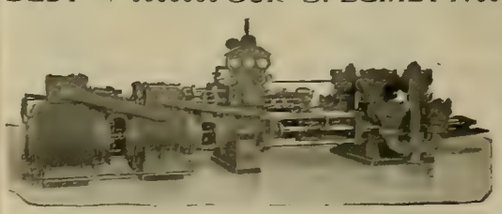
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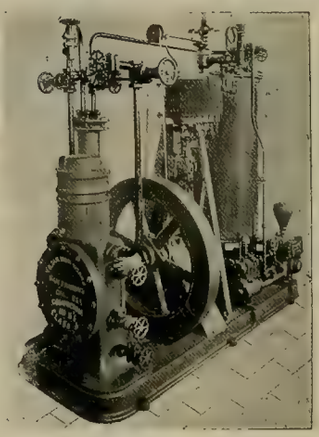
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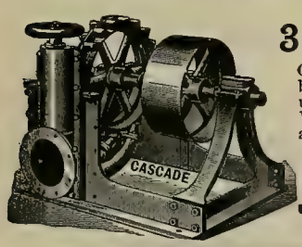
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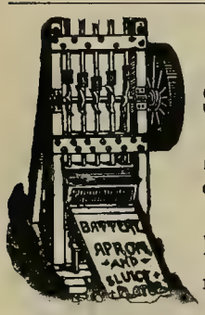
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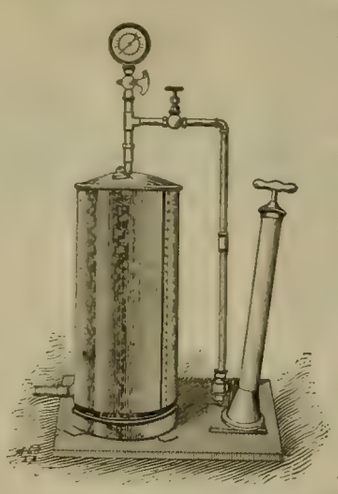
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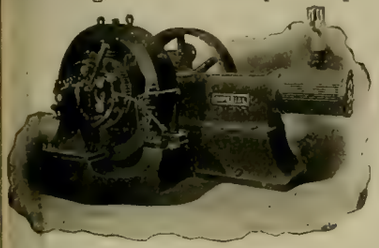
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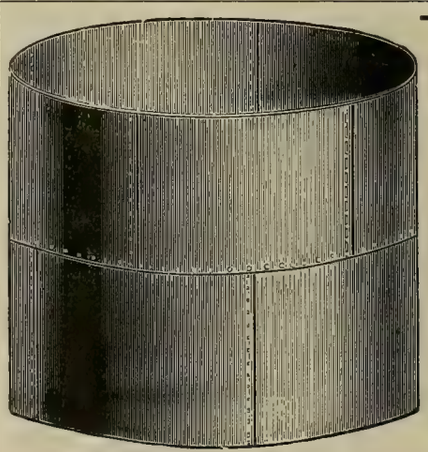
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Market Reports.

The Markets.

SAN FRANCISCO, March 10, 1898.

Jobbers report business quiet the past week, due to a falling off in the demand from outfitters for Alaska and Northwest Territory. It is the current opinion that when navigation on the Yukon opens this year there will be a large call for goods from here for shipment to firms in business up there. The Alaska Packers' Association are large buyers for goods and outfits in its line. The Alaska Commercial Co. will begin to send goods forward in April. It is stated that they will send several thousand tons; in hog products alone they will send over 1000 tons. Considerable mining tools and machinery will go forward also. Dry weather in the southern part of the State continues to be a disturbing factor in the market. It causes some uneasiness, although the more conservative think reports are exaggerated and crops will be larger than claimed, owing to there being so much land under irrigation. In the valleys of Sacramento, Sonoma and a large part of San Joaquin the prospects are good, particularly in the two former, which were never better for large crops.

The local money market is easy, with more disposition to put out funds, now that tax day has passed. The large sums of money sent out of the State, hidden or else accidentally lost, are now available for loaning. There is more disposition to place funds on realty in this and neighboring cities, but the inquiry from this source is light in the absence of any movement in the real estate market. The Australian steamer has arrived with another heavy consignment of gold, bringing the total received so far this season from that quarter up to over $8,000,000. Other shipments are expected from there, owing to sterling bills favoring such a course. Merchants report collections slow, but as outstanding accounts are considerably below the corresponding time in former years the slow collections do not cut much of a figure. Accounts in the dry belt in the southern part of the State are closely scrutinized, but in the more favored sections, or where farm prospects are of the best, fairly liberal credit is extended when desired. Receipts of bullion from the mines are said to be fully up to last year in this month.

New York Silver Prices.

NEW YORK, March 10.—Following are the closing prices for the week:

	Silver in— London.	N. Y.
Friday	25⅛	54¼
Saturday	25⅜	54⅝
Monday	25 3-16	54⅜
Tuesday	25⅛	54¼
Wednesday	25⅛	54¼
Thursday	25⅛	54⅜

	Copper.	Lead.	Iron.	Tin.
Fri.	11 85 @12 00	3 80	9 75@12 00	14 22½
Sat.	11 85 @12 00	3 85	9 75@12 00	14 20
Mon.	11 85 @12 00	3 85	9 75@12 00	14 30
Tue.	11 85 @12 00	3 82½	9 75@12 00	14 35
Wed.	11 85 @12 00	3 82½	9 75@12 00	14 40
Thur.	11 85 @12 00	3 82½	9 75@12 00	14 40

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans, gilt edged	4@4½
Call Loans, mixed securities	5@6
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	10c Prem
New York Telegraphic Transfer	12½c Prem
London Bankers' 60 days	$4.82¾
London Merchants	$4.81½
London Sight Bankers	$4.85½
Refined Silver, per oz., 1000 fine	54⅝
Mexican Dollars nominal	46@—

SILVER.—The market has ruled weak throughout the past week, but at the close it seems to be steadier. The markets at the East and abroad are quite sensitive to any unfavorable news or reports. This is witnessed in the decline at New York on reports put out that India would impose an additional import duty. This we can hardly look for, although the report may possibly be correct, owing to India having a bumper crop of both rice and wheat, but particularly of the former, the exportable surplus of which is put at 1,900,000 tons. The tea crop is also large. To move the rice and wheat crops silver will have to be imported, owing to the mass of the natives of that country not knowing any other metallic currency, and it would seem the part of wisdom to let the white metal in freely. It is quite possible that the Indian government wishes to impose additional duty so as to keep the price up at home. Shipments of silver from New York to Europe continue free.

MEXICAN DOLLARS.—The demand continues light and the market is easy.

COPPER.—The market has held to strong prices. New York mail advices report a sale of Lake Superior at 12c, but orders for more at the same figure were turned down. A London cable, under date of March 1st, reports that large orders are being placed for first-class steamships and also for warships, as well as for railway locomotives. The continental demand has also been active, with numerous inquiries for electrolytic copper. New York mail advices state that there is a continued free export and home demand. An official of the Calumet & Hecla mine is reported as follows: "We are out of the market for the present, for, although we still have copper, we do not care to bring it overland from Lake Linden, and we do not know whether we have sufficient copper in the exact shapes wanted. We make about 100 different shapes, and it sometimes takes a month to fill the orders after they are received. We have sold for March, April and May delivery. I believe the present advance in copper is legitimate, and I believe the price may reach 12c. That figure, however, is likely to be the maximum for the present, unless the domestic demand becomes still more urgent or unless the price abroad advances."

Our market is quoted as follows:

Ingot casting, jobbing	13¼@—
Ingot " wholesale	13 @—
Sheet copper	16¾@—
Bolt	¼ and 5-16, 20c; ⅜ and larger, 16½

TIN.—The market for pig is strong at the East and abroad. Ours is in sympathy. Contrary to the rule, plates do not appreciate. This is doubtless due to a continued competition in selling at the East. In our market there is more or less cutting on big orders.

The market is quoted in jobbing lots as follows:

Pig	4 75	@	5 00
Sheet	....	@	6 50
Pipe	5 30	@	5 80

LEAD.—The market has strengthened, but is not quoted any higher. Eastern advices state that the tendency is to more firmness.

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, " "	4 00@—

SHOT.—Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

QUICKSILVER.—The market rules steady at last week's advance.

Our market is quoted at $40 for domestic consumption and $38@37 for export to the west coast of Mexico.

IRON.—The consumption with us is practically the same as in January. The market is unchanged. The East reports heavy consumption and free exporting, but without any visible effect on the markets there owing to competitive selling.

COAL.—The market is easy with fair receipts, good stocks on hand and a falling off in the demand. Receipts for the week ending with Tuesday were as follows in tons: Puget Sound, 6863; Nanaimo, 7300; Coos Bay, 1025; Departure Bay, 2500. Total, 17,688.

SPOT FROM YARD—PER TON.

Wellington	$10 00@— —
Greta	6 50@— —
Nanaimo	8 00@— —
Gilman	6 00@— —
Seattle	6 00@— —
Coos Bay	5 00@— —
Cannel	10 00@— —
Egg, hard	13 00@— —
Wallsend	9 00@— —

TO ARRIVE—CARGO LOTS.

Australian	6 25
Liverpool Steam	7 00
Scotch Splint	— —
Cardiff	— —
Lehigh Lump	12 00
Cumberland, bulk	9 00
Egg, hard	10 50
West Hartley	7 25

POWDER.—The demand for mining is reported quite heavy.

The market is quoted as follows for Hercules: No. 1, from 11¼c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

PLATINUM.—The market is steady. Our market is quoted in a jobbing way at $16 per ounce and for scrap $11 per ounce.

ZINC.—The market is steady. Our market is quoted at 10@15c, according to thickness.

ALUMINUM.—The market is steady. We quote in jobbing lots at 45@50c per pound for ingots.

BORAX.—The market is very strong with a good demand ruling. There was shipped by water to New York last week 100 tons.

The market is quoted as follows:

Refined, in carload lots, in barrels	7¼
Refined, in carload lots in sacks	7
Powdered, in car lots, in barrels	7¼
Concentrated, " in sacks	6¾

Chemicals.

The same conditions prevail that have ruled for the past few months. The demand is confined to requirements, with no disposition shown to carry much in stock. At New York the situation is the same as ours. There is no line that offers inducements from a speculative point. Nitrate of Soda is the only article in which there is any trading, and the prices for it bob around quite lively. At last advices prompt delivery was scarce and strong, but other deliveries were easy.

CYANIDE OF POTASSIUM.—The market is steady. Our market is quoted for chemical pure, 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The market is firm. We quote in a jobbing way at 1½c per lb. for 66%.

ACETIC ACID.—The market is firm at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BONEASH.—There is a good demand for export. Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady. We quote in a jobbing way at 4c per pound.

SPELTER.—The market is steady. We quote our market in a jobbing way at 5c per pound.

BISMUTH.—The market is firm. Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (Le Blanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—A cargo came in the past week. It was placed before shipment. Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady. We quote in a jobbing way at 70 to 75 cents per pound.

Mining Share Market.

SAN FRANCISCO, March 10, 1898.

The market has hung around the past week at prices showing very few changes. Several assessments were levied and several more are to come on, but whether in this or next month no one seems to know outside of the manipulator for the money pool, and he appears to regulate them by what he is trying to do. It seems to be the opinion with shrewd and successful operators that he is having a line put on now so as to make holders let go at current low prices, by which the more desirable shares can be concentrated. If this opinion is correct, it will be substantiated by the action of the market, for if more shares are wanted, and it is a case of freeze-out, prices will not be advanced while the assessments are on; but if it is assessments, and not shares, that are wanted, then there will be an up-move before they are off, so as to get outsiders to pay the assessments; for the general public are known to hold, and not sell, when the market looks strong at higher figures, particularly when points are well distributed that a big deal is at hand. With the better informed there is a growing belief that the war scare has been used by the manipulator to keep outsiders from buying at present absurd low prices; but now that the conviction is growing there will not be a war, the war-scarecrow influence will not be felt; but what other scare will be brought out it is hard to say. The prices at which the shares are selling do not bring the total aggregate values of the Comstock mines to much over $1,100,000, and the history of the Comstock is that, when they get so low, there is a good substantial advance. The condition of several mines is encouraging. In Sierra Nevada quite a body of ore is being uncovered, as there is in Occidental. Work in Ophir on the 1000-foot level is far enough to the west to justify the use of a drift to see what is ahead. It is only justice to shareholders that a drift should be in several hundred feet, if necessary, so as to tap the gold ledge lying to the west. In Chollar and Potosi it looks as if the kill-time policy should be stopped and active exploiting on or about the 1100-foot level be started. While they may not find much there yet, it may induce them to go still lower when something very good will be found, if it is policy to do so. There is no doubt that the low price of silver has considerable to do with not finding ore. It is reported that more active work has been started in Yellow Jacket; but no one seems to have confidence in the management of this mine. Crown Point, Belcher, Overman and Caledonia so far are not getting anything but assessments from any ore found, and therefore any new or important work started in anyone of them is looked upon with suspicion. The belief prevails that the management of Gould & Curry ought to prospect the Brunswick lode to the north on the Comstock tunnel level. It is known with the older mining men that some work was to be done to the north by the tunnel people and that ore was found which averaged around $40 a ton. If this ore should be followed for some distance and found to assay from $30 to $50 a ton, it will be quite a factor in exciting speculation in Savage, Gould & Curry, Best & Belcher and Con. Virginia, particularly if the ore is found on the upper levels, which all indications warrant their expecting.

The news from the Comstock mines is confined, so far as public advices go, to official letters filed every week, and, with two or three exceptions, they are as barren of anything of interest to the average dealer as a picked bone is of meat for a hungry a imal. When some important work is being done it is so hedged in with red-tape phrases and stereotyped distances as to cause disgust more than interest. Some of the letters it would puzzle a smarter man than a Philadelphia lawyer to make out so as to find where work is being done—but this may be part of the game, and if so, some of the mine superintendents are adepts at performing their parts. The northwest drift in Utah is st ll in seams of clay and porphyry. In Sierra Nevada they will resume work next week in the raise from the Riley tunnel level. When this is completed they ought to take out considerable ore and at the same time continue exploiting at other points. They are still driving ahead in the Riley tunnel. They are pushing ahead in the north drift on the 900-foot Union shaft workings level. The drift is in about 550 feet from the Sierra Nevada shaft. The face is in porphyry. In Union they have stopped No. 2 east crossdrift on the 960-foot level and started west crossdrift No. 2 on the same level. They are still driving ahead east crossdrift on the 1000-foot level of Mexican. This crossdrift is a good time killer and money depleter. It is not in the right direction to strike much if any ore. In Ophir they are still going west on the old Central tunnel level and also 1000-foot level. They are in respectively over 460 feet and over 940 feet. They are still drifting north in Andes on the 175-foot level. They are said to be paralleling the vein. In Con. Virginia no new work is reported officially. According to the last letter filed the work is on and around levels 1550, 1650 and 1750. The letter indicates that the work is preliminary to more active exploiting, but how soon no one seems to know outside of persons close to the inside. There is no change in the work in Best & Belcher and Gould & Curry or formation of material encountered. In Savage they are cleaning out and repairing the main west crossdrift on the 130-foot level. They are in over 400 feet. In Chollar they are crossdrifting to the west on the 1000-foot level. The official letter from the superintendent says that good progress is being made in repairing the main incline below the 1100-foot level. No change is reported in the Potosi-Bullion work. In Alpha they are driving ahead in west crossdrift from the upraise from the 500-foot level. Owing to a heavy flow of water, necessitating enlarging the boxes, no work was done in pushing the west crossdrift that is being run jointly by Confidence, Challenge and Con. Imperial. The Con. Imperial surface tunnel was, at last advices, in old fillings. Reports are current that more active work has been resumed by Yellow Jacket. No work is reported in Crown Point. It seems as if they are waiting for the result of the two milling tests of low grade ore. In Belcher they are crossdrifting to the east on the 850-foot level. They hoisted forty-one tons of ore last week. The assay value is returned at a little over $18 a ton. In Overman they are extracting a few tons of ore. In Caledonia active work is being done on the 1100-foot level. They are preparing, in Justice, to sink on the ore found in west crossdrift No 2. The bullion yield of ore milled was $1225 gold and $637 silver.

From the Brunswick lode there is nothing of special interest additional to what we reported last week. Work is progressing fairly well at the different points where they are working. Persons who keep informed on it through official advices and personal inspection express themselves as well pleased with the results so far. They think that with more work in two of the mines good results will follow. The joint work by Con. Virginia, Best & Belcher and Gould & Curry is confined to a west crossdrift on the 600-foot level, a south drift on the same level, and sinking the shaft. The latter is down on an incline about 850 feet, while the west crossdrift is in about 430 feet and the south drift about 550 feet. The official letter from Chollar is unimportant and about the same as filed the preceding week. Shaft No. 1 is being sunk at the rate of about 17 feet a day. On the main south drift in Potosi on the 600-foot level they are running a crossdrift east and another west. They expect good results from the latter. The official letter from Occidental reports work to the west on the 550-foot and 650-foot levels. They are also driving ahead the main south drift on the latter level. They are running north from the west crossdrift on the 750-foot level, along the foot wall of the vein. It is showing seams of high-grade ore.

The following illustrates the changes of the week:

Mines.	Mar. 3.	Mar. 10.
Alpha	$ 03	$ 09
Alta Consolidated	15	.....
Andes	.....	.....
Belcher	21	26
Best & Belcher	35	31
Bodie	.....	.....
Bullion	.....	.....
Challenge	28	.....
Chollar	.....	.....
Confidence	67	.....
Consolidated California and Virginia	83	78
Consolidated New York	.....	.....
Crown Point	13	14
Exchequer	.....	.....
Gould & Curry	18	18
Hale & Norcross	.....	.....
Justice	31	.....
Mexican	31	.....
Ophir	44	44
Overman	.....	11
Potosi	17	36
Savage	23	.....
Sierra Nevada	95	1 05
Union	34	34
Utah	.....	12
Yellow Jacket	22	26

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alpha Con M & M Co, Nev	20	5c	Feb 1	Mar 8	Mar 29 C E Elliot, 309 Montgomery
Andes S M Co, Nev	45	5c	Mar 7	Apr 11	Apr 28 N Thayer Messer, Nevada Block
Baliol G M Co, Cal	2	30c	Jan 26	Mar 25	Apr 18 R L Cheney, Mills Building
Best & Belcher M Co, Nev	64	20c	Mar 8	Apr 12	May 3 M Jaffe, 309 Montgomery
Con Cal & Va M Co, Nev	11	25c	Mar 8	Apr 13	May 3 A W Havens, 309 Montgomery
Con Imp M Co, Nev	40	1c	Mar 1	Apr 5	Apr 26 C L McCoy, Mills Building
Crown Point G & S M Co, Nev	73	10c	Feb 21	Mar 28	Apr 18 Jas Newlands, Mills Bldg
Fall River Con G Q Co, Cal	11	5c	Jan 15	Feb 25	Apr 21 A Lorsbach, 313-315 Front
Kate Hayes M Co, Cal	6	$1	Feb 25	Apr 5	Apr 26 H Pichoir, 320 Sansome
Marguerite G M & M Co, Cal	9	10c	Feb 19	Apr 6	May 2 F Mettmann, 225 Sansome
Marina Marsicano G M Co, Cal	13	9c	Mar 5	Apr 11	May 2 Charles Bovone, 217 Sacramento
N Bloomfield Gravel M Co, Cal	50	25c	Feb 25	Apr 6	Apr 27 H Pichoir, 320 Sansome
Occidental Con M Co, Nev	30	10c	Mar 9	Apr 12	May 4 A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	72	25c	Feb 24	Mar 29	Apr 18 E B Holmes, 309 Montgomery
Orleans M Co, Cal	7	10c	Feb 1	Mar 8	Mar 28 Geo O Thurston, 575 Mission
Overman S M Co, Nev	79	5c	Jan 26	Mar 2	Mar 23 G D Edwards, 414 California
Potosi M Co, Nev	49	20c	Feb 5	Mar 11	Apr 4 C E Elliot, 309 Montgomery
Richmond G M Co, Cal	2	1c	Mar 2	Apr 9	May 2 L R Tuttle, 328 Montgomery
Sierra Nevada S M Co, Nev	114	20c	Jan 19	Feb 23	Mar 14 E L Parker, 309 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19	Feb 26	Apr 4 A F Frey, Phelan Building

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage.

Money loaned mines.

Mining companies organized, their property experted, financed and managed.

Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated

Examine mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

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PHILADELPHIA BOOK CO.,
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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from John E. Burton, in the Green Mountain Mine near Mokelumne Hill, Calaveras Co., to deposit tailings in Chili Gulch; from the Harville Mining Co., in the Harville Mine near Placerville, El Dorado Co., to deposit tailings in Martinez Creek; from A. B. Jacks, in the Badger Hill Mine near Spanish Ranch, Plumas Co., to deposit tailings in Spanish Creek; and from the Star of Plumas Water and Mining Co., in the Star of Plumas Placer Mine near Buck's Ranch, Plumas Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 68, Flood Building, San Francisco, Cal., on March 28, 1898, at 1:30 P. M.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 10, 1898.

9:30 A. M. SESSION.

800 Belcher	26	700 Overman	11
600 Con Cal & Va	78	500 Potosi	36
300 Crown Point	14	100 Sierra Nevada	1 05
200 Gould & Curry	18	200 Yellow Jacket	26
100 Ophir	44		

SECOND SESSION—2:30 P. M.

100 Gould & Curry	18	200 Alpha	09
250 Best & Belcher	31	200 Utah	12
200 Con Cal & Va	78	500 Overman	11
200 Potosi	36	200 Union	34
300 Crown Point	14		

TEN WEEKS FOR TEN CENTS!

Strange as it may seem, that big family paper, the *Illustrated Weekly Sentinel*, of Denver, Colorado, (founded 1890) will be sent ten weeks on trial for 10c.; clubs of six, 50c.; 12 for $1. Special offer solely to introduce the paper. Gold rings set with Rocky mountain gems are given free as premiums. Latest mining news and illustrations of grand scenery each week, also true stories of love and adventure. Address as above and mention PRESS. Write today; postage stamps taken.

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Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 29-30 Chronicle Building, S. F.

W. & P. Prepared Roofing.

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Pacific Refining and Roofing Co.,
Correspondence Solicited. 113 NEW MONTGOMERY ST., S. F.

Rainfall and Temperature.

The following data for the week ending 5 A. M., March 9, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Minimum Temperature for the Week.	Maximum Temperature for the Week.
Eureka	.12	26 83	40 60	33 39	44	56
Red Bluff	T	12 07	22 53	19 70	48	72
Sacramento	T	8 55	15 37	15.38	48	70
San Francisco	.13	7 45	20 68	18 24	46	64
Fresno	.00	3.46	9.25	7.41	42	78
San Luis Obispo	.00	5 15	19 74		44	78
Los Angeles	.02	4 30	16 08	13 28	44	80
San Diego	T	3 18	10.91	8 42	48	74
Yuma	.00	1 27	5.31	2 75	46	86

WANTED.

A GOLD TAILINGS DUMP that can be worked by the cyanide process. Address, with particulars, Box H, Mercur, Utah.

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WANTS POSITION.

First-Class References. Address ASSAYER, Mining and Scientific Press

WANTED.

Position by a reliable and thoroughly experienced mine bookkeeper, time and stockkeeper, general merchandise clerk, typewriter and stenographer. Age 25. Can furnish own typewriter. Location no object. References. Address J., Mining and Scientific Press.

A Physician,

Aged 27, unmarried, wants position as company surgeon with a mining or construction company. For two years assistant surgeon in Cook County Hospital, Chicago. First-class references.

Address R. U. CRAIG,
Box 172.....Phœnix, Arizona.

Assessment Notices.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of February, 1898, an assessment (No. 9) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 1 to 4 P. M. at his business office, 225 Sansome street.

NORTH BLOOMFIELD GRAVEL MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, North Bloomfield, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 25th day of February, 1898, an assessment (No. 50) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on WEDNESDAY, the 27th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey county, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the eighth (8th) day of March, 1898, an assessment (No. 64) of twenty cents (20c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twelfth (12th) day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the third (3d) day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada Block, No. 309 Montgomery street, San Francisco, California.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of February, 1898, an assessment (No. 6) of one dollar ($1) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 26th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

RICHMOND GOLD MINING COMPANY.—Location of principal place of business San Francisco, California; location of works, Butte County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of March, 1898, an assessment (No 2) of 1 cent per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 406, No. 328 Montgomery street, San Francisco, California

Any stock upon which this assessment shall remain unpaid on the 9th day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

L. R. TUTTLE, Secretary.

Office Room 406, No. 328 Montgomery street, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of March, 1898, an assessment (No. 45) of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 28th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. THAYER MESSER, Secretary pro tem.

Office—Room 22, Nevada block, San Francisco, California.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of March, 1898, an assessment (No. 11) of 25 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 58, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 58, Nevada block, San Francisco, California.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of March, 1898, an assessment (No. 18) of 9 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOYONE, Secretary

Office—217 Sacramento street, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of delinquence in the above assessment notice has been postponed to March 12th, 1898, and the day of sale to MONDAY, April 4th, 1898.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

BALIOL GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of January, 1898, an assessment (No. 2) of 30 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of March, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Mills building, room 7, fifth floor, San Francisco, California.

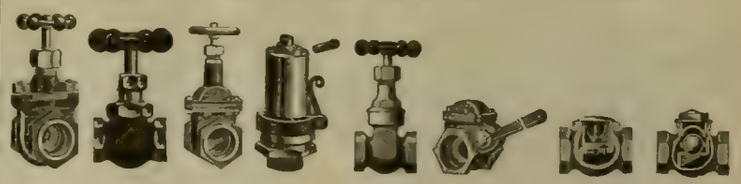
POSTPONEMENT.

By order of the Board of Directors of the Baliol Gold Mining Co., the day of delinquence in the above assessment notice has been postponed to March 26th, 1898, and the day of sale to MONDAY, April 18th, 1898.

R. L. CHENEY, Secretary.

Office—Room No. 7, fifth floor, Mills building, San Francisco, California.

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FURTHER COMMENT UNNECESSARY.

SAN ANTON DE LA HUERTA, MEXICO, Feb. 4, 1898.

GENTLEMEN:—We are not up in for testimonial letter; write one and send it to us and we will sign it. The Dredge so far has given satisfaction. Yours respectfully, YAQUI RIVER MINING CO.

Send for Catalog. WEBER DREDGE CO., 430 S. W. Boulevard, KANSAS CITY, MO.

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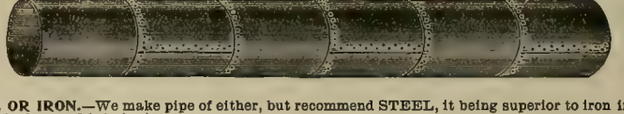
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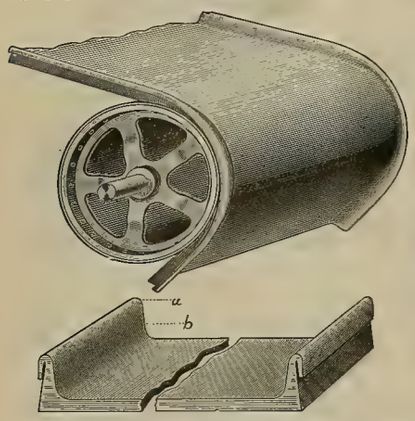
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RAWHIDE GOLD MINING COMPANY,
JAMESTOWN, TUOLUMNE Co., CAL., Feb. 21, 1897.

J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

AMADOR CITY, CAL., Feb. 18, 1897.

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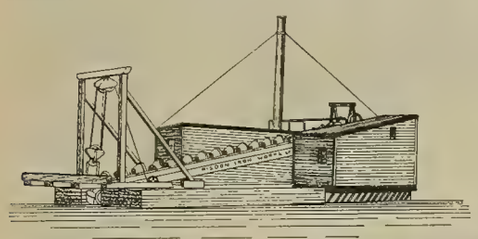
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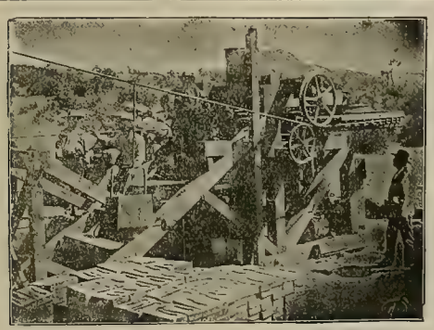
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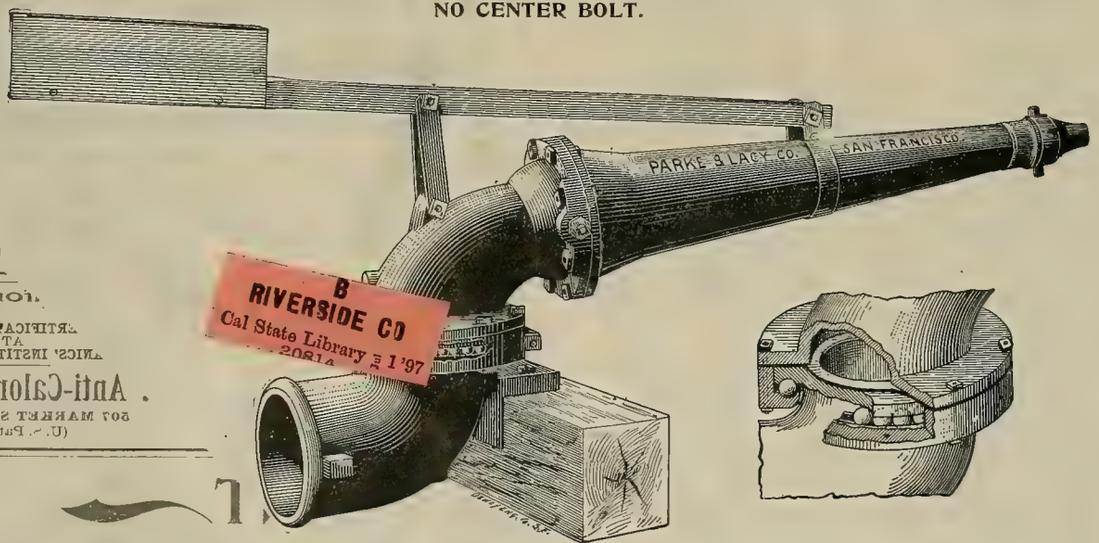
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No. 1967.—VOLUME LXXVI. Number 12. SAN FRANCISCO, SATURDAY, MARCH 19, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Gold Mines of Nevada County, California.

From a pamphlet published by the Nevada county exhibit at the recent mining fair in this city are taken the engravings on this page and page 313. They portray scenes familiar to every California miner and are of interest in connection with the magnitude of the operations they represent. The general appearance of the North Bloomfield mine, illustrated on page 313, has been made familiar this year to the thronging thousands who viewed its reproduction at the Mechanics' Pavilion. If this mine were in the frozen darkness of the Klondike, or the arid torridity of Western Australia, it would be a world's wonder, but being in California it is taken as a matter of course, and the millions it has turned out in the last forty years have been considered as merely something in the usual order of things where California is concerned. The Omaha mine, illustrated on this page, has in present operation 30 stamps; it has produced about $3,000,000, and is being worked to a depth of 1600 feet. The Allison Ranch mine is a good example of the renewed activity now manifest throughout California. It was worked to a depth of only 500 feet on the incline and produced $2,400,000. Flood and Mackay have taken hold of it and the presumption is that its history will be that of other deep-level California mines, which on being pushed deeper after years of cessation of all work have doubled and trebled the millions they had produced from the upper levels. The Champion mine is also portrayed on this page, in the Nevada City district, in which is located what



CHAMPION MINE, NEVADA CITY, CALIFORNIA.



OMAHA MINE, GRASS VALLEY, CALIFORNIA.

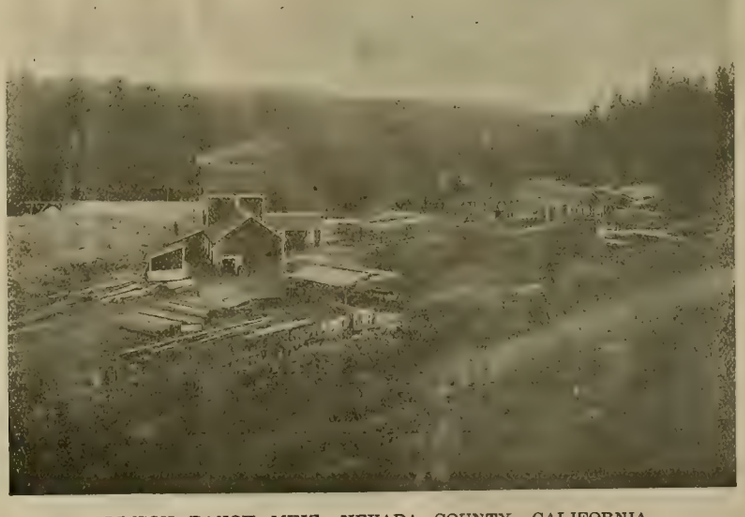
has been dubbed the great father lode. The Champion is at present the deepest and most important mine in the district. It is being worked to a depth of 2200 feet on the incline, a 70-stamp mill being in continuous operation. The Champion has a gold bullion record of over $6,000,000. The Kate Hayes Mining Co., operating at North San Juan, is another example of a good property ably managed.

Nevada county furnishes many prominent and successful examples of hydraulic and quartz mining. Since gold was first discovered in California, Nevada county has contributed an aggregate yield of over $210,000,000; of this great amount about $125,000,000 has been produced by the hydraulic mines and $85,000,000 by the quartz mines. During the recent years the quartz mines have produced more than the hydraulic, largely because of Federal restriction.

One of the famous quartz mines of the State is the Eureka-Idaho-Maryland, in the Grass Valley district. In this property three mining companies have worked one continuous ore chute to a depth of 2200 feet, a distance of 6000 feet, and have produced nearly $20,000,000, of which more than one-half was paid in dividends. It is still and promises to continue to be a producer. The Empire, also in Grass Valley, has probably been worked the most continuously of any similar mine in the State. Other mines have stopped and started, but the Empire has kept on for forty-eight years. It has produced over $7,000,000, and is now being worked at a depth of 2400 feet on the incline. Like the Empire the North Star, another famous Grass Valley mine, keeps a 40-stamp mill in constant operation, is being worked at a depth of 2400 feet on the incline, and has a gold bullion production record of about $6,000,000. At present in Grass Valley district about 380 stamps are dropping, and in the Nevada City district 330.

"Abandoned" mines are proving their worth. The Reward, near Nevada City, is a good example. After years of idleness a company some time ago took the property, drained it, started development, last month cleaned up $6000 and have begun to pay dividends. The Texas and Bellefontaine are also examples of "abandoned" mines, now profitable. The Pennsylvania mine at Grass Valley is producing an average of $6000 in gold every month. This property is an apt illustration of what local enterprise has accomplished in Nevada county mining. The stock is nearly all in small holdings. Three times had the property been closed down. A last effort among the stockholders to push to depth rewarded them on the 800 level. The ore body is fair size and high grade. The mine has paid 5 cents per share every month for fifteen months and has a cash reserve in bank of $30,000.

Great though the yield of gold in this county has been, the output is but an indication of the golden wealth in the 958 square miles of territory within its boundaries. The present prosperous condition of the mining industry in Nevada county illustrates forcibly that improved and economical methods, intelligent management and facility of transportation, make possible satisfactory returns from invested labor and capital in that or any other of the great gold-producing counties of California.



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Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others, and the publishers of the American Newspaper Directory will guarantee the accuracy of the circulation rating accorded to this paper by a reward of one hundred dollars, payable to the first person who successfully assails it.—*American Newspaper Directory.*

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HENRY BESSEMER died in London on the evening of the 15th inst. When such a man as Bessemer dies the mining and scientific world pauses a moment to note the fact. The results of his life were of the highest practical benefit to material development. His greatest discovery—a simple, cheap conversion of pig iron into steel—made the world many thousands of millions of dollars richer. Martien in this country and Bessemer in England discovered almost simultaneously improvements in refining and converting; Mushet in England and Holley in this country succeeded in so reducing the cost and improving the output that Bessemer steel was a requisite everywhere, and the world passed from the age of iron into the age of steel, but to Bessemer is due the highest meed of praise and the immortality that accompanies such a benefactor to his race.

SOME TIME AGO the San Francisco Tool Co. of this city, in accordance with accepted plans and specifications, put in some elevators for the History Building of this city. By reason of the insufficient size of the drum one of the elevators fell, and the owners of the History Building sued for damages. On trial it was found that the specifications called for a 15-inch drum, and that the Tool Co. had exactly complied with all the requirements of the contract. Experts testified that a 30-inch drum should have been used. The judgment of the lower court was in favor of the San Francisco Tool Co. The California Supreme Court, to which the case was appealed, has confirmed the judgment of the lower court, holding that though a 30-inch drum was proved to have been necessary for the work required of the elevator, yet, as the specifications called for a 15-inch drum, and the defendants had complied with all the requirements of the specifications, they could not be held responsible for any failure of capacity—a judgment in which there will doubtless be universal agreement.

Application of Federal Mining Law.

In this issue is concluded the publication of the official compilation of the U. S. mining law, with the most recent rulings, decisions and interpretations thereof, as prepared and approved last December by the Secretary of the Interior and the Commissioner of the General Land Office. The entire volume has thus been published herein for the general information and convenience of the mining public, and a multitude of the questions weekly sent to this office can be easily and authoritatively answered by reference to this and previous consecutive issues containing the latest compilation of annotated federal mining law. Regarding section 53, which has occasioned universal comment and almost as universal protest, it is to be said that much of the fear expressed as to its disastrous retroactive effect has, fortunately, been unfounded. One subsequent circular says:

"Said paragraph 53 embodies the latest conclusions of this department as to the proper construction of section 2325, United States Revised Statutes, relative to the necessary expenditures in a case where several contiguous mining location claims are embraced in one application for patent, and it will be observed that the department decisions and circular instructions made prior to December 15, 1897, which decisions and circulars are in direct conflict with said paragraph 53, were effectually overruled by the promulgation of the paragraph last referred to.

"If A, the owner of four contiguous location claims, either lode or placer, should embrace them in one survey, your certificate as to labor and improvements should show that prior to the period of publication of the notice of application for patent, not less than $500 worth of labor had been expended or improvements made on each of the location claims by the claimant or his grantors; or that not less than $2000 worth of labor had been expended or improvements made upon one or more of the four location claims in such manner as to develop all of the location claims, and to facilitate the extraction of minerals therefrom; and in case his works and his improvements are placed on one, or two, or three of his location claims, the manner in which such labor, work or improvements tend to develop all of the location claims embraced in the survey should be made to appear by clear and satisfactory evidence, and should be fully set out in your certificate. So much of paragraph 44 of the Manual of Instructions for the survey of mineral lands as is in conflict with said paragraph 53 of the regulations is not now operative, and will not be observed."

This settled one point, viz., that instead of allowing $500 worth of work or improvements to suffice in securing a patent for a group of locations, henceforth $500 worth of such work must be shown to have been expended for each location in the specified group. On this point one inquirer wrote saying that he was interested in a group of nine claims, the chief work on which was done on two of them, and that such work could not, under the circumstances, be advantageously performed elsewhere on the property, and that, while the aggregate of work done amounted to more than $500 on each claim, yet as a matter of fact it had all been done in two places. Under date of February 18th, Assistant Commissioner Mondell said in reply:

"Applying the rule announced in paragraph 53 of the general mining circular approved December 15, 1897, to a group of nine contiguous mining claims, claimed under nine locations, and embraced in one application for patent, the applicant would be required to show, under section 2325 of the U. S. Revised Statutes and said paragraph, that not less than $500 worth of labor had been expended or improvements made upon each of the nine claims, or that $4500 had been expended upon one or more of the locations in such manner as to develop each of the nine claims, and to facilitate the extraction of minerals therefrom."

That being thus definitely settled, came up another important question: Would rule 53 be retroactive? That is, would pending applications for patent before Dec. 15, 1897, have to be republished? Would any of them be thrown out because of lack of the required amount of assessment work? In the one land office of Pueblo, Colo., more than 1000 applications on file would be affected, and so in every land office in this west half of America. On the 5th inst., in compliance with the request of this journal, Secretary of the Interior Bliss approved the recommendation of Land Commissioner Hermann to allow proof of expenditure of $500 on the consolidated claims of one or more locations under one entry filed in the past. The authorities at Washington, however, ordered that in future entries the sum must be expended on each location embraced in the consolidated entry. This, while it adhered to the requirement that $500 be expended for each location in the group for which application for patent was made, afforded relief to the thousands of applicants who feared that they would be put to additional trouble, expense and delay were rule 53 declared retroactive.

Now comes additional relief in the definite statement from the General Land Office, under date of the 14th inst., that as to all applications for mineral patent made and passed to entry before July 1, 1898, or which are by protests or adverse claims prevented from being passed to entry before that time, where the application embraces several locations held in common, proof of an expenditure of $500 upon the group will be sufficient and an expenditure of that amount need not be shown to have been made upon or for the benefit of each location embraced in the application.

This, practically, means that the old rule—allowing $500 to be sufficient for the entire group—will not be superseded by "Rule 53" until the first of next July, which effectually disposes of the multitude of fears recently expressed, and precludes possibility of regarding Rule 53 as a "snap judgment."

PROMOTERS of Alaska transportation and mining schemes seem to figure on even more than ordinary gullibility on the part of the general public. Some of the offers and inducements are more barefaced than those of '97. As usual, some of the British schemes are worse swindles than those concocted in this country, which is saying a good deal. In London papers is now being published prospectuses beside which the recent ridiculous romance in the London press, the "prospectus" of a company proposing to operate mines in Plumas Co., Cal., reads like sober truth. This later concern styles itself "a parent company," with £125,000 capital, and proposes to do anything and everything in the Klondike region from supplying "reindeer tanned-skin coats with fur sleeves" to "townsites, water lots," and bonanza placer claims on Boulder creek. Little matters like sawmills, trading stores and railway franchises are scattered in merely as seasoning. Any one buying 500 shares and making certain promises will be carried free from England to the Klondike and return, and paid £200 per year for two years. The usual array of big names head the list of "directors."

THE scant snow and rainfall of the season closing will not inure favorably to the quartz and hydraulic miners of California. The only class of miners in this State who can look upon the present situation with any degree of satisfaction are the river-bed miners. In such a season as the forthcoming months lies their best opportunity to reap a harvest. Heavy snow and usual rainfall means to them extreme hazard, a probability of losing their season's labor and money expended. River-bed mining has been carried on in this State on a scale unparalleled elsewhere. The biggest and costliest schemes of the kind have been prosecuted here, and some of the largest losses and winnings in the history of hydraulic mining enterprises resulted therefrom. "High water" is the foe of the river-bed miner. In a few hours it will wash away a patiently built and expensive plant. This comparatively dry season will largely eliminate the element of chance that necessarily enters into river-bed mining everywhere.

THE Director of the Mint has rescinded the orders directing the liquidation of entries of lead-bearing ores on the basis of his reports on the assay of samples. Portions of such samples will continue to be forwarded to the Director of the Mint, with the reports of assays made by local assayers for occasional verification. Government assayers will, whenever required, be stationed at smelting establishments for the assaying of ores transported under bond.

United States Mining Laws, and Regulations Thereunder, Relative to the Reservation, Exploration, Location, Possession, Purchase and Patenting of the Mineral Lands in the Public Domain.

NUMBER V—CONCLUDED.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That within the State of Alabama all public lands, whether mineral or otherwise, shall be subject to disposal only as agricultural lands: *Provided, however*, That all lands which have heretofore been reported to the General Land Office as containing coal and iron shall first be offered at public sale: *And provided further*, That any bona fide entry under the provisions of the homestead law of lands within said state hereto fore made may be patented without reference to an act approved May tenth, eighteen hundred and seventy-two, entitled "An Act to promote the development of the mining resources of the United States," in cases where the persons making application for such patents have in all other respects complied with the homestead law relating thereto

AN ACT providing a civil government for Alaska.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, * * *

SEC. 8. That the said district of Alaska is hereby created a land district, and a United States land office for said district is her by located at Sitka The commissioner provided for by this act to reside at Sitka shall be ex officio register of said land office, and the clerk provided for by this act shall be ex officio receiver of public moneys and the marshal provided for by this act shall be ex officio surveyor-general of said district and the laws of the United States relating to mining claims, and the rights incident thereto, shall, from and after the passage of this act, be in full force and effect in said district, under the administration thereof herein provided for, subject to such regulations as may be made by the Secretary of the Interior, approved by the President: *Provided*, That the Indians or other persons in said district shall not be disturbed in the possession of any lands actually in their use or occupation or now claimed by them but the terms under which such persons may acquire title to such lands is reserved for future legislation by Congress: *And provided further*, That parties who have located mines or mineral privileges therein under the laws of the United States applicable to the public domain, or who have occupied and improved or exercised acts of ownership over such claims, shall not be disturbed therein, but shall be allowed to perfect their title to such claims by payment as aforesaid: *And provided also*, That the land not exceeding six hundred and forty acres at any station now occupied as missionary stations among the Indian tribes in said section, with the improvements thereon erected by or for such societies, shall be continued in the occupancy of the societies or religious body to which said missionary stations respectively belong until action by Congress, but nothing contained in this act shall be construed to put in force in said district the general land laws of the United States.

* * * * * * *

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, * * *

No person who shall after the passage of this act, enter upon any of the public lands with a view to occupation, entry or settlement under any of the land laws shall be permitted to acquire title to more than three hundred and twenty acres in the aggregate, under all of said laws, but this limitation shall not operate to curtail the right of any person who has heretofore made entry or settlement on the public lands, or whose occupation, entry or settlement, is validated by this act: *Provided*, That in all patents for lands hereafter taken up under any of the land laws of the United States or on entries or claims validated by this act west of the one hundredth meridian, it shall be expressed that there is reserved from the lands in said patent described a right of way thereon for ditches or canals constructed by the authority of the United States. * * *

AN ACT To repeal timber-culture laws, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, * * *

SEC. 16. That town-site entries may be made by incorporated towns and cities on the mineral lands of the United States, but no title shall be acquired by such towns or cities to any vein of gold, silver, cinnabar, copper or lead, or to any valid mining claim or possession held under existing law. When mineral veins are possessed within the limits of an incorporated town or city, and such possession is recognized by local authority or by the laws of the United States, the title to town lots shall be subject to such recognized possession and the necessary use thereof and when entry has been made or patent issued for such town sites to such incorporated town or city, the possessor of such mineral vein may enter and receive patent for such mineral vein, and the surface ground appertaining thereto: *Provided*, That no entry shall be made by such mineral-vein claimant for surface ground where the owner or occupier of the surface ground shall have had possession of the same before the inception of the title of the mineral-vein applicant.

SEC. 17. That reservoir sites located or selected and to be located and selected under the provisions of "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and eighty-nine, and for other purposes," and amendments thereto, shall be restricted to and shall contain only so much land as is actually necessary for the construction and maintenance of reservoirs; excluding so far as practicable lands occupied by actual settlers at the date of the location of said reservoirs and that the provisions of "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and ninety-one, and for other purposes," which reads as follows, viz: "no person who shall after the passage of this act enter upon any of the public lands with a view to occupation, entry or settlement under any of the land laws shall be permitted to acquire title to more than three hundred and twenty acres in the aggregate under all said laws," shall be construed to include in the maximum amount of lands the title to which is permitted to be acquired by one person only agricultural lands and not include lands entered or sought to be entered under mineral land laws.

* * * * * * *

APPOINTMENT OF DEPUTIES FOR SURVEY OF MINING CLAIMS—CHARGES FOR SURVEYS AND PUBLICATIONS—FEES OF REGISTERS AND RECEIVERS, ETC.

SEC. 2334, R. S. The surveyor-general of the United States may appoint in each land district containing mineral lands as many competent surveyors as shall apply for appointment to survey mining claims. The expenses of the survey of vein or lode claims, and the survey and subdivision of placer claims into smaller quantities than one hundred and sixty acres, together with the cost of publication of notices, shall be paid by the applicants, and they shall be at liberty to obtain the same at the most reasonable rates, and they shall also be at liberty to employ any United States deputy surveyor to make the survey. The Commissioner of the General Land Office shall also have power to establish the maximum charges for surveys and publication of notices under this chapter; and, in case of excessive charges for publication, he may designate any newspaper published in a land district where mines are situated for the publication of mining notices in such district, and fix the rates to be charged by such papers; and, to the end that the Commissioner may be fully informed on the subject, each applicant shall file with the register a sworn statement of all charges and fees paid by such applicant for publication and surveys, together with all fees and money paid the register and receiver of the land office, which statement shall be transmitted, with the other papers in the case, to the Commissioner of the General Land Office.

91. Under this authority of law the following rates have been established as the maximum charges for newspaper publications in mining cases:

(1) Where a daily newspaper is designated the charge shall not exceed seven dollars for each ten lines of space occupied, and where a weekly newspaper is designated as the medium of publication five dollars for the same space will be allowed. Such charge shall be accepted as full payment for publication in each issue of the newspaper for the entire period required by law.

It is expected that these notices shall not be so abbreviated as to curtail the description essential to a perfect notice, and the said rates established upon the understanding that they are to be in the usual body type used for advertisements.

(2) For the publication of citations in contests or hearings involving the character of lands the charges shall not exceed eight dollars for five publications in weekly newspapers or ten dollars for publications in daily newspapers for thirty days.

92. The surveyors-general of the several districts will, in pursuance of said law, appoint in each land district as many *competent* deputies for the survey of mining claims as may seek such appointment, it being distinctly understood that all expenses of these notices and surveys are to be borne by the mining claimants and not by the United States. The claimant may employ *any* deputy surveyor within such district to do his work in the field. Each deputy mineral surveyor before entering upon the duties of his office or appointment shall be required to enter into such bond for the faithful performance of his duties as may be prescribed by the regulations of the Land Department in force at that time.

93. With regard to the *platting* of the claim and other *office work* in the surveyor-general's office, that officer will make an estimate of the cost thereof, which amount the claimant will deposit with any assistant United States treasurer or designated depository in favor of the United States Treasurer, to be passed to the credit of the fund created by "individual depositors for surveys of the public lands," and file with the surveyor-general duplicate certificates of such deposit in the usual manner.

94. The surveyors-general will endeavor to appoint mineral deputy surveyors, so that one or more may be located in each mining district for the greater convenience of miners.

95. The usual oaths will be required of these deputies and their assistants as to the correctness of each survey executed by them.

The duty of the deputy mineral surveyor ceases when he has executed the survey and returned the field notes and preliminary plat thereof with his report to the surveyor-general. He will not be allowed to prepare for the mining claimant the papers in support of an application for patent or otherwise perform the duties of an attorney before the land office in connection with a mining claim.

The surveyors-general and local land officers are expected to report any infringement of this regulation to this office.

96. Should it appear that excessive or exorbitant charges have been made by any surveyor or any publisher, prompt action will be taken with the view of correcting the abuse.

97. The fees payable to the register and receiver for filing and acting upon applications for mineral-land patents are five dollars to each officer, to be paid by the applicant for patent at the time of filing, and the like sum of five dollars is payable to each officer by an adverse claimant at the time of filing his adverse claim. (Sec. 2238, R. S,, paragraph 9.)

98. At the time of payment of fee for mining application or adverse claim the receiver will issue his receipt therefor in duplicate, one to be given the applicant or adverse claimant, as the case may be, and one to be forwarded to the Commissioner of the General Land Office *on the day of issue*. The receipt for mining application should have attached the certificate of the register that the lands included in the application are vacant lands subject to such appropriation.

99. The register and receiver will, at the close of each month, forward to this office an abstract of mining applications filed, and a register of receipts, accompanied with an abstract of mineral lands sold, and an abstract of adverse claims filed.

100. The fees and purchase money received by registers and receivers must be placed to the credit of the United States in the receiver's monthly and quarterly account, charging up in the disbursing account the sums to which the register and receiver may be respectively entitled as fees and commissions, with limitations in regard to the legal maximum.

HEARINGS TO DETERMINE CHARACTER OF LANDS.

101. The Rules of Practice in cases before the United States district land offices, the General Land Office, and the Department of the Interior will, so far as applicable, govern in all cases and proceedings arising in contests and hearings to determine the mineral character of lands.

102. No public land shall be withheld from entry as agricultural land on account of its mineral character except such as is returned by the surveyor-general as mineral; and the presumption arising from such a return may be overcome by testimony taken in the manner hereinafter described.

103. Hearings to determine the character of lands are practically of two kinds, as follows:

(1) Lands returned as mineral by the surveyor-general.

When such lands are sought to be entered as agricultural under laws which require the submission of final proof after due notice by publication and posting, the filing of the proper nonmineral affidavit in the absence of allegations that the land is mineral will be deemed sufficient as a preliminary requirement. A satisfactory showing as to character of land must be made when final proof is submitted.

In case of application to enter, locate, or select such lands as agricultural, under laws in which the submission of final proof after due publication and posting is *not* required, notice thereof must first be given by publication for sixty days and posting in the local office during the same period, and affirmative proof as to the character of the land submitted. In the absence of allegations that the land is mineral, and upon compliance with this requirement, the entry, location, or selection will be allowed, if otherwise regular.

(2) Lands returned as agricultural and alleged to be mineral in character.

Where as against the claimed right to enter such lands as agricultural it is alleged that the same are mineral, or are applied for as mineral lands, the proceedings in this class of cases will be in the nature of a contest, and the practice will be governed by the rules in force in contest cases.

RAILROAD AND STATE SELECTIONS.

104. Where a railroad company seeks to select lands not returned as mineral, but within six miles of any mining location, claim, or entry, or where in the case of a selection by a State, the lands sought to be selected are within a township in which there is a mining location, claim, or entry, publication must be made of the lands selected at the expense of the railroad company or State for a period of sixty days, with posting for the same period in the land office for the district in which the lands are situated, during which period of publication the local land officers will receive protests or contests for any of said tracts or subdivisions of lands claimed to be more valuable for mining than for agricultural purposes.

105. At the expiration of the period of publication the register and receiver will forward to the Commissioner of the General Land Office the published list, noting thereon any protests, or contests, or suggestions as to the mineral character of any such lands, together with any information they may have received as to the mineral character of any of the lands mentioned in said list, when a hearing may be ordered.

106. At the hearings under either of the aforesaid classes, the claimants and witnesses will be thoroughly examined with regard to the character of the land; whether the same has been thoroughly prospected; whether or not there exists within the tract or tracts claimed any lode or vein of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin or copper, or other valuable deposit which has ever been claimed, located, recorded, or worked; whether such work is entirely abandoned, or whether occasionally resumed; if such lode does exist, by whom claimed, under what designation, and in which subdivision of the land it lies; whether any placer mine or mines exist upon the land; if so, what is the character thereof—whether of the shallow-surface description, or of the deep cement, blue lead, or gravel deposits; to what extent mining is carried on when water can be obtained, and what the facilities are for obtaining water for mining purposes; upon what particular ten-acre subdivisions mining has been done, and at what time the land was abandoned for mining purposes, if abandoned at all.

107. The testimony should also show the agricultural capacities of the land, what kind of crops are raised thereon, and the value thereof; the number of acres actually cultivated for crops of cereals or vegetables, and within which particular ten-acre subdivision such crops are raised; also which of these subdivisions embrace the improvements, giving in detail the extent and value of the improvements, such as house, barn, vineyard, orchard, fencing, etc., and mining improvements.

108. The testimony should be as full and complete as possible; and in addition to the leading points indicated above, where an attempt is made to prove the mineral character of lands which have been entered under the agricultural laws, it should show at what date, if at all, valuable deposits of mineral were first known to exist on the lands.

109. When the case comes before this office such decision will be made as the law and the facts may justify; in cases where a survey is necessary to set apart the mineral from the agricultural land, the proper party *at his own expense* will be required to have the work done, at his option, either by United States deputy, county, or other local surveyor; application therefor must be made to the register and receiver, accompanied by a description of the land to be segregated, and the evidence of service upon the opposite party of notice of his intention to have such segregation made; the register and receiver will forward the same to this office, when the necessary instructions for the survey will be given. The survey in such case, where the claims to be segregated are vein or lode claims, must be executed in such manner as will conform to the requirements in section 2320, United States Revised Statutes, as to length and width and parallel end lines.

110. Such survey when executed must be properly sworn to by a surveyor, either before a notary public, officer of a court of record, or before the register or receiver, the deponent's character and credibility to be properly certified to by the officer administering the oath.

111. Upon the filing of the plat and field notes of such survey with the register and receiver, duly sworn to as aforesaid, they will transmit the same to the surveyor-general for his verification and approval; who, if he finds the work correctly performed, will properly mark out the same upon the original township plat in his office, and furnish authenticated copies of such plat and description both to the proper local land office and to this office, to be affixed to the duplicate and triplicate township plats respectively.

112. With the copy of plat and description furnished the local office and this office, must be a diagram tracing, verified by the surveyor-general, showing the claim or claims segregated, and designating the separate fractional agricultural tracts in each 40-acre legal subdivision by the proper lot number, beginning with No. 1 in each section, and giving the area in each lot, the same as provided in paragraph 45, in the survey of mining claims on surveyed lands.

113. The fact that a certain tract of land is decided upon testimony to be mineral in character is by no means equivalent to an award of the land to a miner. In order to secure a patent for such land he must proceed as in other cases, in accordance with the foregoing regulations.

Blank forms for proofs in mineral cases are not furnished by the General Land Office.

MINERAL ENTRIES WITHIN FOREST RESERVES.

The following is an extract from circular entitled Rules and Regulations governing Forest Reservations, established under section 24 of the act of March 3, 1891 (26 Stat. L., 1095). Approved June 30, 1897. (24 L. D., 589-593-594.)

LOCATION AND ENTRY OF MINERAL LANDS.

19. The law provides that "any mineral lands in any forest reservation which have been or which may be shown to be such, and subject to entry under the existing mining laws of the United States and the rules and regulations applying thereto, shall continue to be subject to such location and entry," notwithstanding the reservation. This makes mineral lands in the forest reserves subject to location and entry under the general mining laws in the usual manner.

20. Owners of valid mining locations made and held in good faith under the mining laws of the United States and the regulations thereunder are authorized and permitted to fell and remove from such mining claims any timber growing thereon, for actual mining purposes in connection with the particular claim from which the timber is felled or removed. (For further use of timber by miners see below, under heading "Free use of timber and stone.")

FREE USE OF TIMBER AND STONE.

21. The law provides that "The Secretary of the Interior may permit, under regulations to be prescribed by him, the use of timber and stone found upon such reservations, free of charge, by bona fide settlers, miners, residents, and prospectors for minerals, for firewood, fencing, buildings, mining, prospecting, and other domestic purposes, as may be needed by such persons for such purposes; such timber to be used within the State or Territory, respectively, where such reservations may be located.

This provision is limited to persons resident in forest reservations who have not a sufficient supply of timber or stone on their own claims or lands for the purposes enumerated, or for necessary use in developing the mineral or other natural resources of the lands owned or occupied by them. Such persons, therefore, are permitted to take timber and stone from public lands in the forest reservations under the terms of the law above quoted, strictly for their individual use on their own claims or lands owned or occupied by them, but not for sale or disposal, or use on other lands, or by other persons: *Provided*, That where the stumpage value exceeds one hundred dollars, application must be made to and permission given by the Department.

BINGER HERMANN,
Commissioner.

Approved December 15, 1897.

C. N. BLISS,
Secretary.

River Mining in California.

From various sections of the country have been received inquiries regarding wingdams and fluming, and in the issue of the 5th inst. appeared an article on "Wingdams" by Mr. R. L. Dunn. Continued inquiry on the same points occasions the belief that a portion of a more extended article on the same subjects, written by the same gentleman and which has heretofore not appeared in any journal, may be of general benefit. The probability of low water in every California stream this season makes it likely that unusual attention will be given river mining in this State in '98, making the entire subject one of added present interest.

River mining is a branch of placer mining that is carried on in the channels and beds of rivers and large streams. Practically, it may be considered as including the mining of such deep bars as have to be exploited below the surface of the water in the adjacent river. River mining is not local to California, though undoubtedly carried on to a greater extent here than in any other gold-bearing district in the world. As contrasted with gulch and ravine mining and hydraulic mining, it is dry season work, only practicable when the rivers are in their low water stages, as probably they will be this season. Probably no other branch of our gold mining industry is subject to more uncertainty under ordinary conditions than is river mining, yet in no other branch are as large returns possible with comparatively small capital. In the early mining history of California, after the rapid working out of the shallow placers of the high bars, attention was turned to the river channels as the next most certain source for a large gold yield, and in 1852, 1853 and 1854 a very large amount of this mining was done, and most of the gold yield of the State at that time came from this source. During these years all of the large gold-bearing rivers in the State were worked, but the industry gradually declined in relative importance with the discovery and opening of the mines in the old river channels. Hydraulic mining from 1857–8 practically extinguished river mining in many of the rivers by reason of tailings covering up the river claims, and it is only since 1880, coincident with the restriction of hydraulic mining, that the attention of mining men has been directed to the river channels.

The rivers in which river mining is carried on run in narrow canyons more or less difficult of access. Usually the hill and mountain slopes rise directly from the water's edge, but the streams meander for portions of their course from side to side of narrow valleys, leaving small flats, or "bars," as they are termed by the miners, alternately on one and the other side of the stream. The formation of these bars is due to the action of the flowing river. During the period of its gradual erosion, slides from the hillsides, or the accumulating debris of floods, have changed the course and channel of the streams and widened the canyons to narrow valleys. These bars, sometimes high above the present channel of the river, sometimes lower than it, are nothing but portions of its former bed. Often a secondary erosion so changes them that their identity is lost; but wherever they are, the dynamic and hydraulic forces that formed them made them natural riffles and storehouses of placer gold. These deep bars were the dream and the snare of the early miners, probably more effort and capital being expended in unsuccessful attempts to mine them than in any other of the early mining operations, the fabulous yield of the few successfully worked deep bars and adjacent river-bed encouraging similar undertakings that were only abandoned after successive failure had demonstrated the inadequacy of the appliances and methods employed.

River mining is almost entirely a problem of restraining and handling large volumes of water. In the rivers it involves dams and pumps to control the water, so that the bed of the river can be exposed and mined. In deep bar mining the river waters also require control and must be drained away and their influx prevented, and it is this similarity of condition that makes it desirable to consider both under the general term "river mining," though the appliances employed for the latter are of a more permanent character and involve the outlay of more capital than is required for the former.

The season during which river mining is possible begins with the receding of the flood waters in spring and continues until the first rains in the fall raise the waters again. Sometimes this first rise does not destroy the mining plant in the river-bed, and a period of low water following lengthens the season till the winter storms come. The season is therefore an uncertain quantity, varying from year to year, and different in different streams. On the Klamath river and its tributaries the season is given as eight months, beginning about the middle of March or the first of April and ending about the first of December. On the Middle Fork of the American it begins about the first of May and continues till the first of November, usually, though sometimes shuts down as early as October, and sometimes not till the end of December. In the Feather river the season is even shorter, it not ordinarily being practicable—on account of the large water flow—to begin operations before the middle of May nor to continue them after the first of November. The time that can be given to actual mining and taking out of gold is, however, only a comparatively short part of this season. From the nature of the appliances required and their location in the river-bed, they have to be put in anew for every season's work, and frequently the work of fitting up leaves only a few days for mining before the rising waters sweep away in a few hours the work of months. Ten, twenty or thirty days is not uncommon as the time employed in actual mining, but yields of from $500 to $5000 a day for this time are often realized, repaying well the labor and expenditure of fitting up.

River mining, considered with reference to appliances for working, can be considered under subdivisions, as follows:

1. River mining by temporary wingdams, an upper and a lower cross-dam and a connecting dam in and aligning with the stream, reclaiming a portion of the river-bed for mining, and forcing the water flow to the opposite side of the channel without raising the level of its flow materially.
2. "Fluming" or river mining with two temporary cross-dams and a temporary flume laid as near the low water level of the stream as practicable, into which the entire flow is diverted by the upper dam and conducted over the lower. By this method the water level behind the upper dam is only raised from three to four feet.
3. River mining with an upper dam raising the water level above the ordinary high water line, diverting the entire flow into a flume or tunnel of permanent character. The upper dam may or may not be designed to be permanent.
4. River mining through permanent shafts, hoisting and pumping plant on the banks of the stream and mining by drifting under the channel.
5. River mining by elevators, dredges, vacuum pumps and all similar plants, placed usually on a barge or float, and working underneath the surface of the water.
6. Deep bar mining by shafts and drifts.
7. Deep bar mining by stripping and "pitting," employing either steam or hydraulic lifts or elevators.

Wingdams.—River mining by wingdams is the usual method where the volume of water is too great to be flumed. At the present time it is the method exclusively employed on the Klamath river. Considerable of the old mining on the Feather, Yuba and American rivers was done by the construction of such dams, but they are seldom seen there now, except where small companies of Chinese are at work.

The wingdams made for mining are temporary structures, made usually at a cost only of the labor employed. For the "head" (upstream) dam the upper end of a riffle is selected, if possible, and two parallel walls of bowlders are built, not less than six feet apart, and the space between filled in with gravel and sand, the former nearest the outer wall, as sand would gradually wash through the spaces of the bowlder wall and the dam would not be tight. When these walls reach about the middle of the stream, or as far out as it is desirable to mine, they are turned down stream and continued to the lower limit of the ground to be inclosed, then turned, on a riffle if possible, and the "tail" (down stream) dam built, connecting with the same side of the river from which the head dam sets out. Considerable care is required in filling between the walls, in order to make a tight dam. The mining ground thus being walled in, its drainage is then effected by what is commonly known among miners as a Chinese pump, located at the lower end of the mining ground or in its deepest hole. The motive power for this pump is the current of the stream. An undershot water-wheel is built and placed in the stream alongside of the dam, so that the current impinges directly against the paddles. The pillow blocks on which the shaft rests are made of piles driven in the bottom of the river and buttressed by as large bowlders as can be placed against them. The pillow blocks are not fast, but work in vertical slides and can be raised or lowered by levers, so as to control the running of the wheel. If necessary, another wingdam is built out from the other side of the river to turn the force of the current still more against the wheel. This wheel being very liable to be swept away and lost when high water comes, is constructed as simply and cheaply as possible. For the shaft a twelve-inch square timber is used, the ends rounded and protected with iron rings, into which the gudgeons of the two or two and one-half inch cast journals are driven. The diameter of the wheel is usually ten or twelve feet and the width, dependent on the work it has to do, from eight to eighteen feet. The arms are made of 2x4 scantling, sometimes mortised into the shaft, but preferably spiked to flanges made of doubled inch boards from sixteen to twenty inches deep. Three or four sets of twelve arms each are placed on the shaft, this depending on the width of the wheel, and paddles made of inch lumber and twelve inches wide dip into the current. The journals turn in seasoned oak boxes resting on the pillow blocks. A wheel so constructed can be broken to pieces quite rapidly, and the shaft—the valuable part—saved for another season's work when it would not be possible to save the wheel entire. Between the wheel and the pier on the side toward the dam is the gear connecting with the counter shaft, usually a rubber or leather belt running on a wooden drum three feet in diameter and with a twelve to twenty-four inch face, which runs the pump. The pump is simply an inclined box made of one or one and one-half inch lumber and from sixteen to thirty-six feet long. Attached in it at the bottom and under the water is another drum not as large as that on the counter shaft. Over these two drums and through the pump box or barrel runs a tight rubber or canvas belt from twelve to twenty-four inches wide, dependent somewhat on the quantity of water that must be handled, and specially prepared, if the latter material is used, to resist rotting and the grit of the water. On the outer side of this belt, three feet apart, are fastened paddles three to six inches wide and of length equal to the width of the belt. The belt and these paddles just fill the pump box, the lower end of which being open under the water surface and the upper end opening into the discharge flume or box, a continuous stream of water of large volume is pumped or elevated. For lifts of from twelve to twenty feet this style of pump is very effective, and water is frequently elevated thirty feet by means of them. Some of the larger of these pumps handle fifty inches of water. With one or more of them to clear and to keep clear the area inside of the wingdams, the ground is ready for mining. The only appliance required for this other than picks, shovels, wheelbarrows and sluice-boxes is a derrick. This consists of a stout mast sixty to one hundred feet high with a boom guyed with six wire ropes. It has the usual blocks, tackle and windlass, and its utility is in handling large bowlders, clearing away waste for the pit and in lifting gravel to the sluices, though this last is more often done with one or more lifts of shoveling or by wheelbarrows. Where much work is done with the derrick, it may be operated by a small current wheel similar to that already described. For the washing of the pay gravel a small stream of water is let in through the head dam. Should it not be possible to get sufficient grade for the sluices and their discharge over the tail dam, what is termed a dip wheel is used to raise the necessary water. This is a wheel run by the current, but of larger diameter, twenty to twenty-six feet, and less width, four to eight feet, than the wheel used for pumping. On one or both ends on the periphery are buckets that, with the revolution of the wheel, dip up water and discharge it into the washing sluices.

The gravel containing gold is almost invariably right on the bedrock and in its crevices. The depth of the pay varies, sometimes being fifteen or twenty feet and sometimes only a few inches. Overlying the pay is a mass of bowlders and gravel, containing little or no gold, which is removed by the derrick or barrows till a pit is excavated down to the pay gravel. This is then taken out down to the bedrock and washed, the bedrock being carefully creviced and cleaned. The area of the cleaned bedrock is then utilized to pile bowlders and as a dump for the stripping of fresh ground. The general experience of river miners has been that the riffles contained the pay gravel, while the deep holes were comparatively barren of gold. Crevices in the bedrock are often wonderfully rich.

The shortness of the season available for work compels the use of the nights as well as the days. When the ground inside of the dams is worked out, or the rising water stops work for the season, the claim is dismantled and as much as possible of the plant saved. The derrick is first secured, then the pumps, belts, wheels and sluice-boxes.

The cost of fitting up a claim with wingdams, wheels, pumps, derricks and sluices, and the excavation of the pit to pay gravel, is sometimes as low as $500, occasionally as much as $5000, and a safe average of experience places it anywhere from $2500 to $5000.

Fluming.—Fluming, or river mining with head and tail dams across the entire width of channel of the stream, and the diversion of the latter into a flume, is a more expensive and uncertain operation than mining by wingdams, yet much better suited to extensive operations than the other. Where it is possible to mine portions of the bed of almost any stream by means of wingdams, fluming can only successfully be done in the smaller rivers. In the fifties, when river mining was at the extreme height of its importance and prosperity, combinations of several companies of miners working adjacent claims frequently flumed the smaller rivers for miles and worked every foot of the channel.

The season for flume mining is shorter than that for wingdam work. This is occasioned by the necessity of constructing the flume first; and as the flume cannot be built under water, it is necessary to wait till the river is close to its low-water stage before beginning construction. The water in the Feather and American rivers is usually low enough to begin the construction of a fluming plant between the 1st and 15th of June, though some years it is possible to commence as early as the first of May.

The flume is built on one or the other side of the river as is most convenient, right in the water, in

order to have it as low as possible. The dimensions are dependent on the volume of water it is expected to carry. On the North and Middle Forks of the American river, above the junction, from eight to twelve feet was the usual width; below the junction in the North Fork eighteen and twenty feet width was found necessary. In the Feather river at different points twenty-four to thirty-two feet is required, and in Bear river four to six feet was found ample. The depth of the boxes varies from three to five feet. The grade given should not be less than three inches to one hundred feet, a rapid flow being desirable to give the necessary power for current wheels and to lighten the weight on the flumes by keeping the depth of flow low. The whole construction is of the most temporary character. Stringers 10x12 or 6x10, rough pine logs smoothed by the ax, are laid about four or four and one-half feet apart and posted up where necessary; on the stringers are laid the sills or cross-ties, 4x4 scantling, three feet apart. The uprights of scantling are cut round at the foot and driven into two-inch auger holes in the ties; the wider flumes are braced from the ends of the cross-ties and the narrower by strips nailed on the tops of the uprights. The bottom and sides are made of inch boards. Experience has found such a flume able to carry water five feet deep without showing any evidences of weakness or giving way. The head and tail of the flume require the most care and attention as regards construction, owing to the danger of leaking or of undercuttings. At the head the flume is flared out with a gradual taper to nearly double the regular width and projects beyond the line of the head dam from nine to twelve feet, the third or fourth cross-tie being brought into exact line with the stringers or plate on the inclined frames of the dam. Before the flume is floored boards are driven down from this tie to the bottom of the stream on the slope of the planking of the dam, so that the jointing with it will be tight. Large rocks, gravel and finally sand are immediately thrown in on the foot of these inclined planks to keep the current from undercutting, and the entire space in front of them to the head of the flume is then filled up solid with rocks and gravel before the floor is laid. At the tail end of the flume, in the line of the tail dam, before the floor is laid, two lines of planks are driven down vertically from two of the cross-ties, six feet apart, and the space between filled up with bowlders and gravel and made a part of the dam.

As soon as the flume is built the construction of the head dam is made. This is a timber dam; but, being temporary, and only calculated to sustain the pressure of from two to four feet of water, it is constructed of the cheapest and most accessible materials as far as possible. The pines on the adjacent canyon slopes furnish the timbers. These are roughly squared and faced with the ax. For the location of the dam the upper end of a riffle is preferable. Frames or bents are first made of timbers eight to twelve inches square. These bents are triangular, and consist of a mud-sill ten to eighteen feet long, to which, at one end, the inclined sill or stringer plate is trenailed with a two-inch trenail, the angle between the two timbers being made from 30° to 45°, the frame being then completed by a brace timber set at right angles with the inclined sill and footed into the mud-sill, and fastened to both by two-inch trenails. For large frames a second brace is put in. Boards are spiked each side of this frame above the mud-sill, making a box, which is filled with bowlders, and enables the frame to be floated upright into place. The placing of the frames, which are set from eight to sixteen feet apart, dependent on the depth of water and force of the current they are set in, is commenced at the head of the flume, care being taken to secure a perfect alignment in order that the bearing of the stringers and planking shall be evenly distributed. If the current is not too strong the frame can be put in place by two or three men on each side of a frame, otherwise two ropes are fastened to the nose of the frame and the frame snubbed into place from the river banks. The bed of the river on which the mud-sill is seated is smoothed off with a crowbar, the frame weighted into place with bowlders and temporarily tied to the other frames with strips until all the frames are in place. On the inclined slope of the frames stringers are laid. These are timbers as long as they can be cut and from eight to twelve inches through between the ax-smoothed sides. These are laid on the inclined sills above the water's surface and forced below it as near to the bottom as possible, the pressure of the current keeping them in place without further fastening. A second stringer is then laid on the frames about four or four and one-half feet above the first, which will bring it at the surface of the water usually, and then a third an equal distance above the second. The dam is then planked with inch boards twelve to sixteen feet long, according to the depth of the stream, the planking commencing at the flume and going toward the opposite side of the stream. An expert can push a plank down, edge to the current, until bottom is reached, when it is turned and forced into place with the current, or the boards can be slid down the stringers to the bottom, no fastening being required to keep them in place. As the laying of the planking progresses, large bowlders and gravel are dumped at its foot from a temporary staging to prevent the current undercutting; and as soon as the planking is completed, bowlders, gravel, sand and earth are wheeled in and dumped against the planking until the dam is tight and all the water flows through the flume. The tail or foot dam is then constructed, on the lower end of a riffle preferably. Two walls are built of bowlders and large rocks, not less than six feet apart, and filled in between with sand and gravel, the construction being similar to that of wingdams as already described. A tail dam is not always essential, as a riffle may protect the pit against back water. With the completion of the tail dam the pit is ready to be cleared of water. One or more undershot waterwheels are set up in the flume and driven by the current. These furnish power for the Chinese pumps, derrick and, if used, the electric light plant for working the claim at night. The opening of the ground by pits and the mining out and washing of the gravel has been already described in connection with the method of river mining with wingdams. The ground is mined out underneath the flume and head dam by putting in posts as fast as the support of the ground is cut away. A slight rise of the stream does not necessarily close down mining by wingdams, as the portion of the channel occupied by the water flow is so large that it may carry the additional water of the rise without overtopping the dams; but, in fluming, a slight rise may overtax the capacity of the flume and fill the pit. In fluming, the material put into the dam is almost certainly an entire loss at the end of each season; also, it is not expected that any of the flume will be saved. With good luck, the wheels, pumps, derricks and lighter plant may be taken out of the river and saved over from one season until the next.



NORTH BLOOMFIELD MINE, NEVADA CO., CAL.—(See page 309.)



FRENCH CORRAL MINE, NEVADA CO., CAL.—(See page 309.)

The cost of fitting up a fluming claim from year to year cannot be given with even approximate accuracy, as unforeseen contingencies enter largely into it with every different claim and in different years with the same claim. It is safe to say, however, that this expense—except in very small operations—will not be less than $3000 and may be $10,000.

River Mining.—Concerning the general proposition of river mining, it is subject to great uncertainty in the matter of ascertaining whether or not the particular ground it is proposed to exploit has ever been worked or not. Purely surface indications cannot be depended on, and the period of general activity in this branch of mining is now so long past that there is little or no reliable information possible from residents of the locality. But though the river beds may have been worked over once years since, the tailings from hydraulic and drift mines have replaced much of the gold that had been taken out. By means of elevators and large heads of water, it will prove profitable to work over these tailings in many of the larger rivers. Again, the winter flood waters are constantly working these tailings down stream and with them considerable amounts of fine gold. It would not, I think, prove unprofitable to put undercurrents in the rivers at points where they can be protected from washing out. The yield, of course, is not large, but neither is the expense connected with this kind of plant. Another method of work which is economical is the construction of a bedrock cut, paved with riffles, through which the great volume of the river and tailings are carried by the winter floods, the sluice being cleaned up in low water. This last described method of mining is rather more applicable to the smaller rivers and canyons where there is a high grade than to the large, wide rivers, but is sometimes of assistance in the latter in cleaning off the top ground of a pit.

The Arizona School of Mines.

TO THE EDITOR:—In the interest of mines and mining (in a legitimate way) I believe we, one and all, are agreed on that proposition; but when an institution steps in, claiming to be endowed by a Territory and is using United States funds to pay its professors, it is time for the general mining public to inquire into the disinterestedness of certain parties in fostering mining.

When Prof. Wm. P. Blake was made professor of school of mines, he was given the special privilege of experting mines; his salary is paid out of the agricultural college funds.

Enclosed I send you a copy of the last A. T. Assembly act, No. 68, creating a commercial assay office. The former act created a school of mines. Does this act, No. 68, repeal the former and convert the school of mines into a commercial assay office?

Enclosed you will find a scheduled rate of assaying and working of ores, and Prof. Wm. P. Blake's directors' published report in this Tuesday's (Feb. 8th) issue of the *Morning Star*. Ex-Gov. E. C. Hughes is president of the so-called University of Arizona board of trustees.

This report may be of interest to the general mining public of the United States.

In examining into the report of the professor we find that the total receipts for nine months of 1897 were $1064.15, out of which the assayer, Mr. Jacobs, receives $100 per month, and one of the university students is paid $25 per month for crushing the ore samples.

Assay material and coke are charged to the office, and, also, for and in consideration of the increased business, a new building of three rooms, costing $1100, has just been completed, together with the former appurtenances, such as laboratory, mill, concentrator and sampling works, were erected largely with funds furnished by the United States for an agricultural college.

All of these funds were converted and used for the purpose of carrying on a mining bureau for the benefit of ———, and mines placed on the New York and other markets for speculation.

E. L. WETMORE.

Tucson, Arizona.

There seems to be considerable difference of opinion in Arizona on this subject, which opinion naturally largely depends upon the point of view, as in all such cases. An assayer doing business in Arizona would doubtless consider bill No. 68 an unwarranted infringement on his interests, placing him in competition with the Territory. The miner or prospector in Arizona, in whose interests bill No. 68 was presumably made, might entertain a different view. These things must work themselves out; though it is to be said in other communities where the same action as that of the Arizona Legislature was taken, the ultimate results were not mutually satisfactory.

LESS than twenty years ago a veteran lumberman was heard to laugh at the idea of making paper from poplar and spruce wood. He claimed it was impossible. Now the wood-pulp industry consumes more than half of all the spruce cut in this country. That skeptic belongs to the class of men who scorned the idea of ocean steam navigation. One very learned man, Dr. Lardner, in a lecture delivered at Liverpool, said: "As to the project which is announced in the newspapers of making a voyage directly from New York to Liverpool, it is, I have no hesitation in saying, perfectly chimerical, and they may as well talk of making a voyage from New York or Liverpool to the moon." The skepticism of that age was great. The chief naval architect of one of England's dockyards said to Scott Russell: "Don't talk to me about iron ships—it is contrary to Nature." Fortunately the knowledge of the world is not all locked up in the brain boxes of a few men.

Gold Deposits, Geology and Geography of Alaska.

The MINING AND SCIENTIFIC PRESS has published a mass of authentic information about Alaska, the Yukon and the Klondike region. Much of this was original, being high-priced articles by specialists: a portion of it was selected from the best sources, chiefly recent government reports and accounts of well-posted miners.

The U. S. Government has just issued another pamphlet on that region prepared by W. H. Dall and F. C. Schrader, and personally edited by S. F. Emmons of the U. S. Geological Survey. In the pamphlet is much that is of present interest. Prof. Emmons says:

In mining for gold man reverses the order of the natural processes which have produced such concentrations of this and other metals in the earth's crust as can be worked by him at a profit. In the solid rocks the useful metals were first concentrated in interstitial spaces, generally cracks or fissures, where they filled the vacant spaces and sometimes impregnated or replaced to a certain extent the adjoining rock. Such concentrations constitute original ore deposits. In these the metallic minerals are generally accompanied by some earthy minerals; and as, in the case of gold deposits, this earthy mineral is nearly always quartz and the most commonplace of deposit is a vein or fissure, the term "quartz vein" has come to be almost universally used among mining men to designate original deposits of gold-bearing ores, even when the spaces filled were not strictly fissure veins. This generic use of the term "quartz vein" will be followed in the succeeding pages.

In the ordinary processes of nature, after rocks have been formed and consolidated, they are folded, crushed and lifted up into mountain ranges, and then worn down and disintegrated by cold, heat, rain and other destructive agencies, and finally transported by running water and rearranged and distributed in river valleys or on beaches. During this transportation and rearrangement the heavy particles in the detrital material, or gravels, naturally settle to the bottom in the valleys or on the beaches; hence, where these detrital materials come from the wearing down of rocks containing gold deposits, there results a concentration of the gold at favorable points, and a later class of deposit is formed, which is called by the generic name "placer."

In placer deposits, where nature has already done part of the work of separating the gold from its matrix, man finds the readiest remuneration for his labor, but in searching for deposits of this character he must be guided by such knowledge as is attainable with regard to the source of the concentrated gold. Although very finely divided gold may be transported long distances in the sands of large rivers and may settle in considerable quantities at favorable localities, the coarser gold, which yields the greatest remuneration, is rarely carried far, hence the richest deposits must be sought near the source of the gold. In the following statement of what is known with regard to the economic resources of Alaska, therefore, there will first be given such ideas as may be deduced from the incomplete observations that have been made in this vast region with regard to its geological structure and the probable position and extent of the rocks containing the original deposits of gold, and then a description of its various forms of placer deposits.

Alaska may be divided topographically into a coastal and an interior region. The international boundary between American and Canadian territory has no relation to the physical structure of the region; hence, in this description, that portion of British Columbia which lies opposite the Alexander Archipelago and the coastal strip of American territory southeast of Mount St. Elias will be considered as part of the general province of Alaska. The known portions of the interior region, which lie mainly south of the Arctic circle, belong to the drainage system of the Yukon river. This stream with its various tributaries drains the northwestern portion of the Cordilleran system included between the coast and the Mackenzie River valley, which are about 700 miles apart and approximately parallel. The Mackenzie river flows from Great Slave lake into the Arctic ocean. The Yukon has a general northwest course for about 700 miles (neglecting curves), and then, at its junction with the Porcupine, bends abruptly to the southwest, reaching Behring sea at a distance of about 650 miles in a straight line from the bend. Its earlier or northwest course, which is also that of many of its principal tributaries, is evidently dependent upon the older features of the mountain structure, but the change to a direction transverse to this may have been determined in a comparatively recent geological period. To one tracing the broader features of physical structure northwestward from the United States through British Columbia, it would seem that the mountainous region between the Yukon and the Mackenzie represents the Rocky mountains proper, and the Alexander Archipelago and adjoining coast slopes the Coast Ranges. The basin of the Upper Yukon (the river above the great bend) would then be the representative of the Great Basin region in the United States, since north of the 49th parallel the uplift of the Sierra Nevada has merged with that of the Coast Ranges into one general system.

The Yukon river is characterized by a great volume of water, which carries with it large quantities of detrital material that in the lower reaches forms considerable bars and islands. Its valleys are alternately very broad and very narrow. The broad stretches often contain modern lakes, or, as the stratified gravels on the sides show, occupy ancient lake basins, now drained; in the narrow stretches the river is frequently confined within vertical canyon walls, in which it is sometimes cutting through transverse mountain ranges, sometimes through fields of lava, generally basaltic, that have spread across its track. The greatest of the open valleys is known as the Yukon Flats, which includes the region of the great bend, commencing near Circle City. Much of the Lower Yukon runs also through more or less open valleys, low tablelands or mesa regions, whose surface is occupied by nearly horizontal beds of Tertiary or even more recent age. At places it cuts down through these and exposes older rocks, forming parts of partially submerged mountain ranges, as the so-called Lower Ramparts.

Little is known of the structure of the coastal region beyond the immediate coast line except the narrow strip of territory known as southeastern Alaska. The mountainous islands of the Alexander Archipelago are supposed to constitute part of the range which culminates in Mount St. Elias and beyond splits into two ranges, one trending westward with the bend of the coast, the other continuing in a northwesterly direction and probably forming the southern watershed of the Tanana river. The Coast Range proper is a broad elevated belt with many scattered peaks, but not differentiated into continuous ranges. Oceanward it presents an abrupt, rugged front, cut by fiord-like valleys. To the east is a plateau-like region which descends gradually to the north from an elevation of 5000 feet in the upper lake region to 3000 feet in the Lower Lewes and Pelly River valleys. The river valleys in this stretch often lie 2000 to 2500 feet below the general plateau level.

The coastal belt of southeastern Alaska and westward to Kadiak island has the abundant precipitation and consequent luxuriant forest growth which characterize the northwest coast regions as far south as Puget sound, and hence the rock surface is deeply covered and the underlying rocks are decayed so as to make prospecting extremely laborious. But west of Kadiak island, along the coast, there is no timber.

In the interior region the precipitation is comparatively slight, and considerable portions are above or north of the limits of timber growth. The precipitation is, however, chiefly in the form of snow, and the soil is frozen for a large portion of the year, so that there is comparatively little rock decay. Where there is no timber the surface is generally covered with an abundant growth of moss. This, wherever the surface material is sufficiently compact to become impervious to water by freezing, produces large areas of swampy tracts, even on sloping ground, which, except in the glaciated regions or when cut through by large streams, obscure the rock surface and render difficult the work of the prospector.

It is not perhaps generally known that the theory of an Arctic ice sheet extending outward from the Polar regions has been proved by investigations of recent years to be fallacious. Many persons, including some who might be supposed to speak with scientific authority, have committed the error of ascribing to the placer deposits of the Yukon a glacial origin. It is now known that the great continental glaciers of former times spread out in every direction from certain elevated regions peculiarly subject to great accumulations of ice and snow, and that one such centered in the mountains of British Columbia between latitudes 53° and 59° N. and had a northwestward as well as a southward movement from that central region. The limit of the extent of this northward-moving ice sheet was readily recognized by the various geologists who have visited the region in recent times, and is roughly defined as crossing the Lewes river just above the mouth of the Big Salmon, and the White river near the Donjek, or following approximately the 62d parallel, so that the Yukon basin below these points has not been affected by any general glaciation.

At present, so far as known, it is only in the coastal region that deep mining is being carried on in gold-bearing veins. Here it has become a well-established industry, and many large quartz mills are running on the ore extracted from these veins. The principal deposits are found in a belt somewhat over 100 miles in length on the seaward slope of the mainland, reaching from Sumdum on the southeast past Juneau to Berners Bay near Seward on the northwest. This belt may be also considered to include the deposits on the shoreward side of Admiralty and other islands. A second belt, farther west, is represented by the deposits on the western side of Baranof island, not far from Sitka. The ores, though not always exceptionally rich, are worked at a good profit because of the natural facilities of the region for cheap reduction. The most notable instance of this is the great Alaska-Treadwell mine, which has extracted over $7,000,000 worth of gold from an ore carrying $3.20 a ton, which is worked at an average cost of $1.35. Such conditions cannot be expected to obtain in the interior.

These deposits occur in metamorphic slates, diabases and granites, all similar to the rocks of the auriferous belt of California, and probably, like those, they are of post-Jurassic age. Owing to the dense covering of living and fallen forest trees in this region, prospecting is extremely difficult, and it is probable that future exploration will prove the extent of these gold belts to be much greater than at present appears. The gold-bearing beach sands from Lituya bay to Yukutat bay along the west foot of the St. Elias range and the placers at the head of Cook inlet, around Turnagain arm and on the Kaknu river, may have been derived from the wearing down of rocks of similar age and composition on the Kenai peninsula.

At Uyak bay, on Kadiak island, gold deposits in slates are being worked, and the gold-bearing beach sands of the western end of that island and at Portage bay and the Ayakulik river, on the neighboring mainland, are apparently derived from metamorphic slates associated with granite, so that it is possible that these more recent gold-bearing rocks extend that far westward. On Unga island, of the Shumagin group, still farther west, gold occurs in eruptive andesites of Tertiary age, and several mines have been opened on these deposits, the most important of which is the Apollo, one of the most successful in the province. As the Alaska peninsula and the Aleutian islands are largely made up of recent eruptive rocks, this is an important indication, showing the possibility of the occurrence of valuable deposits in such rocks. Some mining and prospecting has already been done on the island of Unalaska, at the extreme point of the peninsula.

In the Yukon basin the gold, so far as known at present, is derived from a much older series of rocks, for the gold-bearing slates of the coastal region have not yet been recognized there. While the exact age of these gold-bearing rocks has not yet been determined, they are known to be older than the limestones supposed to represent the Carboniferous and Devonian formations of the cordilleran system; hence they are probably pre-Paleozoic, and in part are possibly as old as the Archæan. The grounds for assuming this derivation are that these rocks contain abundant auriferous quartz veins and that the richest placers thus far discovered are so situated that they must have been derived from them. These rocks are classified by Spurr as follows, commencing at the base:

Basal Granite Schist.—This, so far as known, is the fundamental rock formation of the region. The granite has characteristically a somewhat schistose or gneissic structure, thus showing evidence of having been subjected to dynamic action or intense compression, and it may pass into a gneiss or even a mica schist, where this action has been most energetic. On the other hand, it is sometimes massive, showing no parallel structure planes, and then is with difficulty distinguishable from the massive younger granites, which are also of frequent occurrence in the region in the form of dikes and intrusive masses cutting across older rocks. As distinguished from the granites of the coastal region, which are intrusive, these older granites are generally of reddish color and crumbly nature, while the later ones are dark gray from the abundance of hornblende as a constituent mineral.

Birch Creek Series.—Resting upon the fundamental granite is a series of rocks, roughly estimated as possibly 25,000 feet in thickness, named the Birch Creek series, from the place of their typical occurrence. They consist mainly of quartzitic rocks, generally thin bedded or schistose, so that they pass into mica schists; in some places they contain carbonaceous matter and develop graphitic schists. There are also bands which probably originated as intrusive rocks, but which, by compression, have become schistose like the other members. These rocks have abundant quartz veins; they are generally parallel to the schistosity or bedding, small and not persistent, but some cross the bedding and are then wider. They carry gold with abundant pyrites and sometimes galena. They are often broken and faulted.

Forty-Mile Series.—Younger than the Birch Creek series, but in general closely associated therewith, is another thick series of rocks, called the Forty-Mile series because of their development on Forty-Mile creek. They are characterized by alternations of beds of marble, from a few inches up to fifty feet in thickness, with quartzitic and other schists, which may be micaceous, hornblendic or garnetiferous, and sometimes graphitic. They are traversed by abundant dikes of eruptive rock, mostly granites and diorites. Two sets of quartz veins are developed in these rocks: (1) An older set, which are generally parallel to the schistosity or lamination, like those in the Birch Creek series, and like them are broken by later movements and carry pyrite and occasionally galena; (2) a set of larger veins, which form an apparent transition from dikes of aplite, a rock con-

sisting of quartz and feldspar. They cut across the bedding and are not disturbed by later rock movements, hence are younger in age.

Rampart Series.—This still later series is primarily distinguished from the preceding by the darker color of its rocks, which are dark green when fresh and become a dark red by weathering. They consist largely of basic eruptive materials, beds of diabase and tuffaceous sediments, with hard green shales and some limestones containing glauconite, or green silicate of iron. They also contain novaculites, or fine-grained quartzitic slates, and jasperoids, or iron-stained quartzose rocks. Serpentine and chlorite, noticeable by their softness and green color, are frequent alteration products. These rocks also contain a few quartz and calcite veins, which are generally developed along shear zones, or places where by rock movement and compression a series of closely appressed parallel fractures are developed. The basic character of these rocks and their large content of pyrite seem favorable to the concentration of ore deposits; they present, moreover, certain analogies, both in composition and in geologic position, with the copper-bearing rocks of Lake Superior. But the observed veins are younger than the joints and shear planes, which were probably produced by the rock movements that crushed the veins of the older series, and assays of their ores have as yet shown but insignificant amounts of gold and silver. These veins, as well as those in the granite, are, moreover, much less abundant than those in the Birch Creek and Forty-Mile series; hence it is thought that the latter are probably the principal supply of gold in the placers.

The younger rock series noted are, briefly, the following:

Tahkandit Series.—This consists of limestones, sometimes white and crystalline, generally green or black, alternating with shales. In certain localities, notably on the Tahkandit river, it has conglomerates carrying greenish pebbles supposed to be derived from the rocks of the Rampart series. In the beds of this series have been found fossils of Carboniferous age and plants of Devonian aspect.

Mission Creek Series.—Later than the Tahkandit series, but, like it, not very well defined, is the Mission Creek series, consisting of shales and thin-bedded limestones with gray sandstones. Locally, there are thin beds of impure lignite and at the base a conglomerate ("cement rock" of the miners) containing pebbles not completely rounded derived from older rocks in the neighborhood, which sometimes carries gold. The beds of this series are sometimes altered and sharply upturned and folded, but generally have a rather fresh appearance. In the neighborhood of shear zones they are impregnated with pyrite and carry small quartz veins. The limited exploration of these rocks has developed no important deposits of mineral. The age of the beds is as yet uncertain, but they are in part as late as Cretaceous.

Kenai Series.—Next above the Mission Creek rocks, and not always readily distinguishable from them, is a great thickness of rather loosely consolidated conglomerates, shales, and sandstones, generally greenish in color, which are the coal-bearing rocks of the region; they everywhere contain plant remains, and rest unconformably upon the older rocks. They have, however, been folded to a certain extent, and stand upturned at angles of 20° to 60°. They are supposed to be of Eocene Tertiary age.

Later Tertiary Beds.—Other and more recent Tertiary beds have been observed, generally in the more open country of the Lower Yukon, which have little economic importance, though they sometimes contain thin lignitic seams. They are variously known from the localities where they have been observed, as the Nulato sandstones and the Twelve-Mile and Porcupine beds, the two last named being assumed to belong to the same series.

The more recent formations, silts and gravels, will be considered under the heading "Detrital or Placer Deposits."

The most definite facts with regard to the occurrence of the gold-bearing formations, the Birch Creek, Forty-Mile, and Rampart series described above, were obtained by the reconnoissance made by members of the United States Geological Survey in the summer of 1896, under the charge of J. E. Spurr, in the American portion of the Yukon district.* Data gathered by earlier geologists, notably those of the Canadian Survey and of C. W. Hayes and I. C. Russell of the United States Geological Survey, have provided suggestions as to the extent of these rocks in outside areas, but the reader need only bear in mind the enormous area, the difficulties of exploration, and the want of accurate maps of the region, to realize that generalization must as yet be very tentative and liable to future change.

As shown by the map, the belt in which these rocks have been found extends about 500 miles in a general northwest-southeast direction, but there are indications that the actual extent of these exposures may be twice as great.

The best-known exposures of these rocks occur along the northeastern flanks of a broad belt of fundamental granites and crystalline schists which apparently form the central nucleus or backbone upon which they rest. This belt is known in a general way to extend up the Tanana river from near its mouth southeastward across the White river below the Donjek. In the latter region C. W. Hayes reports quartzites and limestones resembling the Birch Creek and Forty-Mile series on the southern flanks of the granite, but the width of the belt, and whether there is any considerable extent of the gold-bearing formations along its southern flanks, is as yet unknown. It may not improbably extend into the high range south of Tanana, of which Mount McKinley is the culminating point, and in which the Kuskokwim and Sushitna rivers of western Alaska take their rise, for from the reports of Moravian missionaries and of the traveler Dickey it appears that gold occurs in the sands of each of these streams. To the westward the granite backbone appears to pitch gently downward, as its surface area narrows, and no exposures are known west of the Yukon river. It is probably not a continuous mass of granite on the surface, but contains smaller areas of the later rocks folded in with it. East of the international boundary the area in which the granite occurs apparently widens, but its exposures are less continuous, the overlying rocks not yet having been worn away. One granitic axis appears to extend eastward from the Forty-Mile district through the Klondike region in a nearly east-west direction, which is the prevailing strike of the sedimentary rocks. The Canadian geologists report a second granite axis on the Dease river just below Dease lake, which may belong to the older granites, though they do not make the same distinction that Spurr does between the older granites and the later intrusive rocks.

Rocks of the various gold-bearing series above the granite are reported at the following localities: Their first appearance, to one ascending the Yukon from the sea, is near the mouth of the Nowikakat. From here up to the Tanana river, rocks of the Birch Creek series outcrop frequently along the river, when not concealed by Tertiary sandstones and conglomerates, and the range of low mountains on the north side and parallel to the river is probably formed of these and Forty-Mile rocks. About three miles above the mouth of the Tanana granite is exposed on an island in the Yukon, and twelve miles higher calcareous quartzitic schists of the Forty-Mile series appear under the Tertiary conglomerates. From the mouth of the Tanana up to Fort Hamlin, at the lower end of the Yukon Flats, the river runs in a canyon-like channel, known as the Lower Ramparts, cut through a low range of mountains which consist principally of the dark greenish and reddish rocks of the Rampart series, except where these are buried under Tertiary conglomerates. The latter rocks occur immediately above the exposures of Forty-Mile rocks, and again from Mynook creek up beyond the mouth of Hess creek. Higher up on these streams the Rampart rocks come to the surface, and the Forty-Mile rocks are supposed to be uncovered at their very heads. Between the two areas of Tertiary rocks the Rampart rocks occupy a belt fifteen to twenty miles wide along the river, and are cut by great dikes of intrusive granite.

From Fort Hamlin up to near Circle City, a distance, neglecting curves, of about 200 miles, the river flows through a perfectly flat region covered by fine silts and gravels, known as the Yukon Flats, in which no outcrops of solid rock have been observed. In the Birch Creek district, around the headwaters of Birch creek and southwest of Circle City, the Birch Creek series occupy a broad area; their general strike is east and west, curving at either end to the northward, and the prevailing dip is between 5° and 30° to the south. There is, however, evidence of a northern dip as well, and the Forty-Mile schists and marbles rest upon them along the trail to Circle City. Marbles, probably belonging to the Forty-Mile series, are also reported in the hills between Birch creek and the Tanana to the southward.

At the crossing of Birch creek by the trail from Circle City, and along the Yukon river for thirty or forty miles above the Yukon Flats, rocks with the characteristic dark coloring of the Rampart series are exposed. From these up to the mouth of Mission creek rocks of the Tahkandit, Mission Creek, and Kenai series occupy the banks of the river. On Mission creek itself only these later formations are found, but the gold in the gravels is supposed to come from the conglomerates ("cement rock") of the Mission Creek series, which contain pebbles of the older rocks. On American creek, the main branch of Mission creek which comes in from the south, the dark rocks, shales, limestones, and tuffaceous beds which form the bedrock are supposed to belong to the Rampart series, which also occur along the Yukon river from five to ten miles above Mission creek to within twenty-five miles of the mouth of Forty-Mile creek. Above this to some distance above Forty-Mile creek the river runs in beds of the Mission Creek series.

(*To be Continued.*)

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A Plea to Speaker Reed.

J. H. Neff, president California State Miners' Association, recently sent a letter to Hon. Thos. B. Reed, speaker of the House of Representatives, Washington, D. C., regarding the California mineral land bill, in which, among other things, he called Speaker Reed's attention "to the bill now pending in the House, on favorable report from the committee, called the Mineral Land bill, and intended to provide for the examination and classification of the unpatented lands lying within the limits of the land grants to various railroad companies in this State. This bill is similar in effect to the 'Idaho-Montana act' passed by Congress in 1895, and its passage is earnestly desired by the miners and general public of this State as a proper measure to preserve the mineral lands lying within such grants to the miner and the prospector.

"It is not the purpose of this bill to deprive any railroad company of any lands belonging to it by virtue of any grant made by Congress, but to segregate the mineral from the non-mineral lands in such grants.

"Congress has repeatedly declared that the railroad companies should not have the mineral lands within their grants and that no Act of Congress should be construed to give them any, but the machinery provided by existing law is inadequate to provide for the proper investigation of the character of the lands sought to be patented by the railroad companies, and the result is that the patents are too often issued to them without the consideration which the interest of the Government and the public requires.

"This is particularly true in this State, where large tracts of well-known mineral land and land lying within well-known mineral belts have been patented to railroad companies as non-mineral land.

"To remedy this, the California Miners' Association, composed of about 8000 representative mining men of this State, has had the said bill drafted and presented to Congress by Mr. De Vries.

"We respectfully urge upon you that you do whatever may be within your power to secure for this measure a hearing before the House."

Points on Headlights.

To the Oregon *Mining Journal* W. J. Wimer, of Waldo, Or., writes:

For years we were at a great expense keeping those heavy round glass points in our headlights; they are very expensive, difficult to cut and hard to keep in when once they get cracked, besides that they are always on a strain in a metal frame and break much quicker on a metal base than in a wooden sash. Two years ago I made wooden sashes for our lights, since which time we have had very little trouble with them and small expense.

A glass 12x14 if set high at the bottom is large enough, 12 up and down and 14 wide. Common window lights are better and give a better light than those thick, heavy ones.

To make the sash use coal oil box material, cut four pieces long and wide enough to fit your lamp frame inside and leave a square hole the size you want your glass; now cut out four more strips for the back of sash, drawing them in a little all around for the glass to lie on; tack these eight pieces together with wire nails, clinching them on the inside; take off the metal strips inside of the lamp frame so the sash will fit up close to the front; make two holes through the metal, one at the top and one at the bottom, insert two common wood screws into your sash to hold it; fasten the glass in the frame with tacks same as window lights. Your tacks should be outside so you can replace a glass without taking the frame out. This way one size glass will fit all the lamps in a mining camp.

Coal Statistics of Pennsylvania for 1897.

The following statistics are reliable and official as regarding the anthracite product of Pennsylvania for 1897:

	Anthracite. Long Tons.	*Bituminous, Short Tons.*
Tons of coal mined	46,947,354	54,674,452
Tons of coke made		8,533,291
Persons employed	149,557	88,554
Coal mined per employe	314	617
Coal mined per miner	490	744
Fatal accidents	424	149
Non-fatal accidents	1,106	426
Life lost per 1000 employes	2 83	1.68
Accidents per 1000 employes	7.39	4.81
Production per life lost	110,725	366,942
Production per non-fatal accident	42,448	128,344

Compared with 1896, these statistics show a decrease in the production of anthracite coal of over a million tons, while the output of bituminous has increased nearly four and one-half millions of tons, and the output of coke nearly two millions of tons.—Mines and Minerals.

California Electrical Enterprises.

California leads in the number and magnitude of its electrical enterprises as it does in other things. The stimulus given to the development of the State by the discovery of the fact that gravity and electrical generators can convert into energy and power California streams flowing from the mountains has put into successful operation several commendable projects in this State that at first were deemed almost impracticable, but are now of commercial value. Considerable space has been given in these columns to illustrated descriptions of great California schemes, from their inception to their successful completion. Many of them challenge the admiration of engineers everywhere, and the fame of the State has thus been sounded to the remotest corners of the earth.

The extension of what were already large enterprises is in contemplation, with assurances of ultimate success. Fresno county, in the southern part of the State, is the site and center of one of these unusually large electrical projects. The power is derived from the north fork of the San Joaquin river, delivered in Fresno City—a distance of thirty-six miles from the generating station—and utilized there for light and power. This system has now been extended to Hanford—a further distance of thirty-three miles—and will probably be delivered by 19,600 volts. This electrical extension is believed to be the longest line and highest voltage in the world. The transmission of electrical power over a wire sixty-nine miles in length is an event in the history of electricity. On this line the electrical loss is unusually low—a maximum of 18 per cent, including water wheel loss at the generating station.

At Visalia, in Tulare county, likewise in the southern part of the State, the mayor of that city and the manager of the local water works, with others, are interested in a project to bring electrical power, amounting to 1600 H. P., to Visalia from a point thirty miles east, utilizing the waters of the Keweah river, the plant to cost about $250,000. Work has begun, and it is expected that by August 1st, '98, it will be in successful operation.

In Los Angeles, also in the southern part of the State, the San Gabriel Traction Company organized last week with a million-dollar incorporation, the proposition being to build an electric line from Los Angeles to Pasadena, with branches to Duarte, Monrovia and Sierra Madre. These are among the latest, but do not comprise all in that section of the State.

Another, of interest to San Francisco, embraces the transmission of 10,000 H. P. from the Sierras in Alpine, Amador and Calaveras counties over a line 110 miles in length to San Francisco. The Blue Lakes Water Company system in the counties mentioned is relied upon to furnish sufficient water supply. This company has several natural and artificial reservoirs, ranging in altitude from 6000 to 8500 feet above the level of the sea. Other storage sites have been decided upon, which, in connection with those already established, will, it is believed, furnish sufficient water and fall to meet all practical requirements. This portion of the plant is of itself a huge scheme, but one that, properly managed, is susceptible of success. The total storage capacity of the present reservoirs is 210,000 million gallons.

The method of developing electrical power is by means of a water wheel, to which the water from the end ditch is led by large wrought iron or steel pipe of sufficient strength to resist the great pressure. It is intended in connection with this last scheme that the ditch and canal system will end in a terminus where there shall be a fall of about 1050 feet, occasioning static pressure of 480 pounds per square inch on the pipe. The end of this pipe is to be divided into several "Y" branches, leading into the power house, the elevation of that being 620 feet above the level of the sea.

At present there are three 600 H. P. generators, and small transmission lines for power and lighting run north through Amador and south through Calaveras counties, the latter being leased by the California Exploration Company for a period of thirty years under contract.

The idea is to supply dynamos sufficient for 10,000 H. P. at the power house, and, if the demand justifies, to supply additional dynamos sufficient for 10,000 more. A voltage of 30,000 volts is to be used through a copper ⅜-inch wire, which will weigh about 8000 pounds per mile and will cost in the neighborhood of $120,000. In this regard the idea is to have the transmission line as short as possible and to have one transformation of the intensity of the current. It was intended originally that a conduit should be constructed under San Francisco bay; but it is manifest that a tower construction would be less expensive and more feasible. The tower line has been located along the eastern side of the Alameda peninsula, and if the requisite permission can be secured from the United States government, it is proposed to carry this power on the tower line across San Francisco bay to this city.

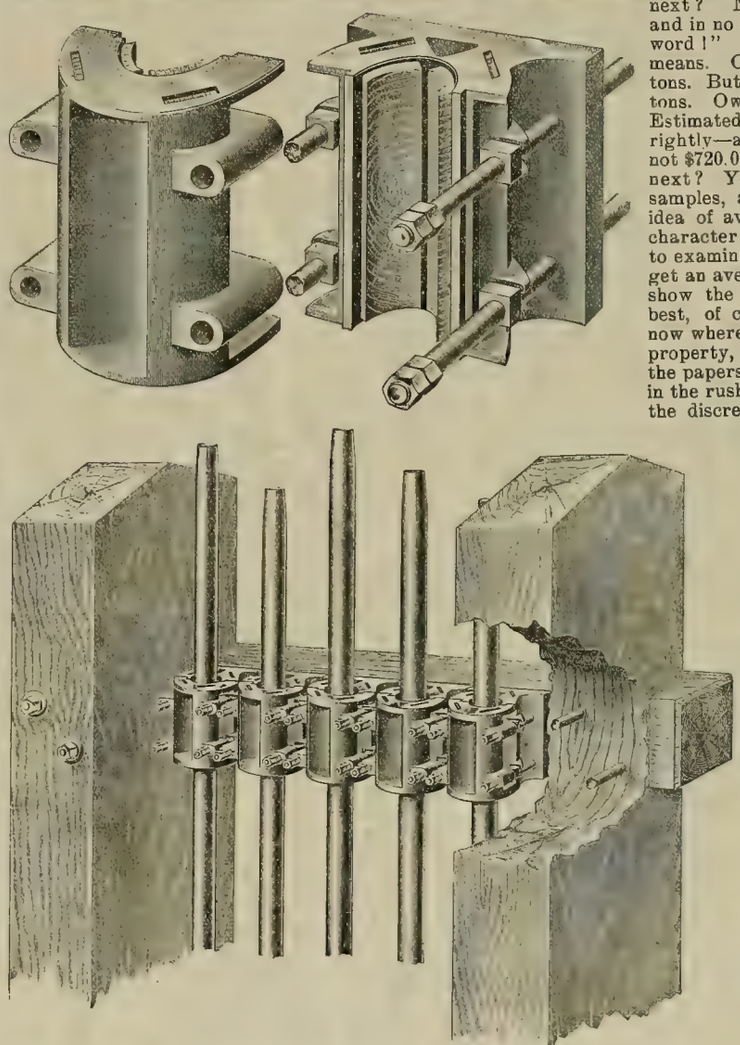
As stated, this huge project involves the transmission of electrical force from the high Sierras 110 miles to the sea. Reaching this side of San Francisco bay, the line would run through the manufacturing belt of the Potrero, the idea being to supplant coal and steam by electricity. The problem of fuel in San Francisco has always been a serious one to manufacturers. In the central Mississippi valley coal for making steam can be bought for $1.50 per ton; in San Francisco it has cost $7 per ton.

The scheme involves the expenditure of about $1,000,000—three-fourths of which would be required for the building of the electrical machinery and transmission line. Of course the engineering problems involved are arduous and difficult — among others the suspension line across San Francisco bay. Local concerns say that for $50,000 they can build the required three high steel towers—the tops of which should be 200 feet above the surface of the bay. It is proposed that between the tops of these a steel carrying cable shall be suspended, to which is to be attached the transmission line.

This is a mere outline of the scheme. That it is not visionary is evident by the attention given it by practical men. Upon the successful completion of such projects depends largely the prosperity of the manufacturing future of this city.

Improved Sectional Stamp Guide.

Herewith is illustrated an improved sectional stamp guide, interchangeable and made to fit and replace the regular common guides whenever so required. They are furnished by the Edw. P. Allis Co., 9 Fremont St., San Francisco.



IMPROVED SECTIONAL STAMP GUIDE.

Crushing, Friendly and Amusing.

TO THE EDITOR:—A friend of mine, who has been endeavoring to enlarge his fortune by mine promoting, received from his correspondent some days ago quite a crushing letter, which, in his tribulations over it, he brought to me to see what I thought of such criticisms, and how it had better be answered. It amused me so much I thought it well to have your readers take a smile also, and especially as it applies not only to my friend's lack of judgment when properties are framed up for the Eastern market, or elsewhere, but to very many others, who may get a very good lesson through it. Well, here it is: B. L. D.

NEW YORK, Jan. 15th, '98.

DEAR SIR: You write the funniest letters. If your imagination would prove as active in writing a novel as in your correspondence with me about mines, Dickens would not be in it, and mining, as compared to your success in fiction, nowhere. In a general way, all your premises and statements are wildly incorrect. The first statement you gave of the ——— gold mine was a short one by letter, in which you said you would get more data and report. I went and saw B. and he said all right—he would like a property just such as you laid out. He said, also, he would like a brief but concise report, written by some one who knew how to make it, which quietly implied to me that you did not. A report came, and he looked over it, and spotted the lies at once, saying no vein 150 feet wide ever carried the richness stated. Your letter indicated higher values than the report, consequently they will await the assays. All you sent me I know as well as you do, and far better, and so did he, all the time; and I think I know some things you don't appear to know, or prefer to overlook, one of which is that you have never gotten your trade in shape—I mean to a point of final consummation. It is all the time promised. You all the time keep me waiting for something beyond. The other statements sent all contradict your letters. You quote the report quite flippantly, but I notice you don't attempt to reconcile the letters to it, which state * * * report is a lie. In his report he goes on and describes a property having $20 ore and $720,000 in sight, based on one shaft and several drifts, running in several directions. In his letters he repudiates all he said of physical facts—facts in his report—and now says he took the owner's word for it. You also say "owner's description of the property," "owner's word" on a property, and that to be presented to the largest house on this continent! What next? No such drifts as stated and in no such directions. "Owner's word!" You and I know what that means. Ore in sight not quite 30,000 tons. But I know there is not 15,000 tons. Owner's word again for you. Estimated value, if I recollect it rightly—and I do—is $270,000, and not $720,000, as in the report. What next? Your expert then sends you samples, as he states, not with any idea of average value, but to show character of the rock. A man sent to examine a mine and no attempt to get an average sample of the ore to show the value, but specimens—the best, of course! What next? I see now where I stand in presenting this property, and I quietly work to get the papers out of their hands, hoping in the rush of business they will forget the discrepancies and thus save our credit; but you take them and bind them as a crown unto yourself. What next? To cap the climax of folly and errors—and, I will say, foolishness—the assays follow me to Mexico. And what are they? These picked specimens of rock show an average value of $7.94 a ton—not $18, and $20, and $50, and $69, and $73, as reports state. And assays included all metals! Now, I think you will agree with me, that to be made a damned fool of sixteen or seventeen times in different directions, on the same property, and with the same parties in the one deal, is quite enough. Now, you may think I am annoyed at the situation and your letters, but I am not. I appreciate the situation a fellow is in, with a mine for sale on an owner's statement.

Your friend, ———.

Such occasions are not extremely unusual. San Francisco mining engineers generally are cognizant of the fact that a large number of mining statements and reports can be found at any time in San Francisco about our interior mines, all on the market for sale, but when an expert of mines comes to examine them some of them often show on their face inconsistencies and misstatements, that do more harm to the mining interest than a proper report would make. For such a statement to go East or to Europe it is still worse, by causing an outlay for examination, which ends not only in loss of expense money, but loss of confidence and a feeling of disgust, to the great injury of California.

Reporting on mines, where one has experience, is a very exact work, and properly done—we may say honestly done, and in detail—a buyer can tell if he wants a property of the kind. And if the report shows on the face that it was made by one who understands his business, a great point is gained; but if full of inconsistencies, a doubt is thrown on the whole and an injury is done to owners and the State as well. A clear, concise, truthful statement goes a long way in selling a meritorious mining property.

Cyaniding and Chlorination.

Concluding an article on the electro-chemical treatment of gold and silver ore, C. E. Webber notes that the presence of the excess of an acid such as hydrochloric acid has to be provided for by the addition, say, of lime, to make the solution neutral; but this will not get rid of any excess of hypochlorite, if present. Lime, to remove free chlorine, will not be added until any metals in the solution, such as copper sulphides, or arsenides, have been formed into electrolyzed salts through conversion into chlorides. These, which cause waste of cyanide of potassium, would to a certain extent go into solution, and, by electrolytic action, become deposited in the mercury and their values saved. It will be understood, therefore, that all this preliminary work not only amalgamates a large proportion of the free gold and silver, but also prepares for the more effective action of potassium cyanide, both as a solvent and as an auxiliary in producing the condition of increased conductivity in the solution.

Thus, everything that chlorine can do to help the disintegration of the metallic ores which are found accompanying gold facilitates the action of potassium cyanide when it is added. This preliminary disintegration would be helped, not hindered, by temporary increased acidity of the liquid, when bodies like sulphides are oxidized at the expense of the chlorine; showing that the best time for neutralizing the solution is at the end of this preliminary stage, and just before the potassium cyanide is introduced.

In all this preliminary stage it will be seen that the eventual economy of potassium cyanide (or other solvent) should be aimed at, because, although with "percolation" processes the "leaching" can be effected with even half a pound of it, as much as two pounds of it to the ton of ore under treatment may be here required. Obviously, the greater part of it is wasted, as, in treating a low-grade ore containing, say, fifteen grammes of gold, and, say, thirty grammes of silver, 60 per cent of the gold and 40 per cent of the silver may be separated and amalgamated in the first two or three hours, and before the potassium cyanide is added. Clearly, it does not require two pounds to treat six grammes of gold and eighteen grammes of silver, even if all the values that remain in the sludge could be dissolved.

The addition of potassium cyanide (K C N) to an ordinary agitating vat causes the solution of some of the finely divided gold; and a further solution will ensue when, by the passage of an electric current, a decomposition yielding free cyanogen at the anode and caustic potash and hydrogen at the cathode will ensue. So far the reactions are common to all arrangements which combine agitation with electro-cyanide processes.

It is also desirable to have some cyanide to spare, because the cyanogen ($C_2 N_2$) formed at the anode and dissolved in the solution will readily unite with the minutest and lightest particles of gold, to form with some of the said excess of it the double cyanide of gold [Au K $(C N)_2$], which is a salt that is easily soluble and readily electrolyzed.*

Mr. Webber concludes that these conditions point to the advantage of getting rid of any excess of hypochlorite and of acidity by neutralization before the cyanide (K C N) is added; also, avoiding excessive oxidization of it, when, if an insufficiency were to ensue and tests were neglected, it is possible that Au CN might be formed and remain insoluble, and hence escape electrolysis and pass away in the tailings.

There is an advantage also in the simultaneous electrolysis of both sodium chloride and potassium cyanide, though the duty of the former is principally to facilitate the conductivity of the electrolyte. Chlorine and cyanogen are both yielded at the anode, and would probably lead to the production of cyanogen chloride, which (in common with cyanogen bromide) would be in the presence of potassium cyanide, as effective in attacking gold, if not more so, as cyanogen itself. The difference between this and what is known as the Sulman-Teed process is, that in that cyanogen chloride (or bromide) is added mechanically to a solution containing potassium cyanide and gold or silver ore, whereas in this process the conditions is to effect a corresponding reaction are produced electrolytically.

The following is a simple means of testing quantitatively for the presence of gold and silver in the solutions with potassium cyanide as a solvent at each stage of treatment, which can be easily used by the lawyer in charge: Take 500 cubic centimeters of solution. Heat nearly to boiling point. Add two grains sulphate of copper (bluestone) and two grains of sodium sulphide. Add hydrochloric acid, so as to have a strong acidity. Heat to boiling point. Filtrate the black precipitate in which all the gold and silver are retained. Scorify the precipitate with 50 grains litharge. The precious metals are recovered from the lead by cupellation. The sodium sulphide used in this test is made in a very simple way, by fusing in a crucible one part of carbonate of soda and one part of sulphur. The crucible must be well covered.

*Observation to ascertain the continued presence of cyanide (K C N) is made from time to time with the nitrate of silver test—drop in the test-tube of the solution. If too much chloride of sodium is present, the effect would be masked by the formation of chloride of silver, when it would be difficult to distinguish the cloudiness of liquid caused by the one from that caused by the other. In such case iodide of starch, which is bleached by potassium cyanide, but not by chloride, is useful as a substitute for nitrate of silver.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER IX.

By GEO. F. BECKER.

There seem no other possible theories besides those discussed, but Mr. Hamilton Smith is quoted as stating that, in his opinion, the gold is partly detrital and partly in place in the banket. Speaking with exactness, I agree with him, for, as he has mentioned, the white quartz veins are not absolutely barren. To my mind, however, it seems conclusively proved that only a minute fraction of 1 per cent of the gold has this origin, for I see no reasonable evidence that any portion of the gold, excepting that to be found in the white quartz seams, is untransported.

Consequences of Placer Theory.—On the theory which I have adopted the auriferous banket should be found to stretch along a line of ancient coast bounding an area in which gold-bearing quartz veins were rich and numerous. How large this area may have been, and therefore how long its ancient coast was, is as yet impossible to say; but the indications are that the area was extensive and the coast long. Doubtless some portions of the coast will furnish only banket too poor to work, but until the Lower Cape formation has been traced across the continent of Africa other spots as rich as the Rand may be hoped for.

In the search it will probably be found that coarse pebble is a necessary, though an insufficient, indication of rich ore. In other words, to produce rich ore close natural concentration and therefore rapid currents were needful, but these could not avail to produce rich reef along stretches where there was a deficiency of gold. As was pointed out above, the oceanic currents about South Africa must always have flowed in a westerly direction; for these currents are ultimately referable to the direction in which the earth rotates. These currents must have been strongest where least impeded, and can not have been of full strength in bays or bights.

Were the Main Reef series continuously exposed across South Africa, marking the southward termination of the continent in the early Paleozoic, such general considerations might be neglected. As a matter of fact, this series is only very partially exposed, and must be sought on some theory or other under later formations. In such a search it is certainly important to note that coarse banket at any point means a shore along which the currents were unobstructed and which was unsheltered by promontories projecting still farther south. This hint may be considered useful in discovering the banket, however this has been charged with gold. On the other hand, if the marine placer theory is true, the westerly side of promontories will show small pebble and little gold, and this will be true, also, of bays and bights in proportion as they are offered protection from the coastal currents.

The confidence with which the deep levels of the Rand can be explored must depend largely on the true theory of the origin of the gold. On the favorite impregnation theory the deposits must be subject to the sudden, seemingly eccentric, changes of quartz veins. At any time the gold tenor might be found to drop suddenly to zero, because unforeseeable obstructions had prevented the circulation of the auriferous solutions over a certain area. On the other hand, on the marine placer theory a sudden failure of gold is not to be anticipated, and a discussion of the conditions along the outcrop furnishes strong reason to believe that the yield will keep up to a great depth.

Other Pre-Tertiary Gold-Bearing Pudding Stones.—Examination of the auriferous conglomerates or banket of the Transvaal has led me to believe that this rock is an early Paleozoic beach deposit, closely analogous in origin to those now forming both on the Pacific coast of North America from Lower California to Alaska and on the New Zealand shore. The Witwatersrand banket is sometimes discussed as if it were the only gold-bearing pudding stone yet discovered, excepting, of course, the well-known Tertiary and Post-Tertiary river gravels. As a matter of fact, a considerable number of pre-Tertiary auriferous conglomerates are known. They occur in North America, Australia, New Zealand, and even in France; some of them are also (locally at least) very rich, but none of them is known to be both extensive and rich, like the main Main Reef series of the Transvaal. It is a matter of interest to compare such occurrences, so far as they have been described, and for that reason the following notes are set down. They are doubtless incomplete, for I have not made a systematic search for instances through geological literature, yet they seem sufficient in number to show that the Witwatersrand banket is anomalous only in its vast aggregate value.

In France.—Gold is found in a Lower Carboniferous conglomerate (millstone grit) in southern France, in the Department of Gard, near Besseges. According to M. Theodore Picard this conglomerate furnishes the gold dust carried down by the Gardon, the Ceze, and the Gagnieres. According to Mr. J. A. Phillips this conglomerate has been worked and has yielded small quantities of the precious metal. There can be no doubt, it seems to me, that this conglomerate, one of the most persistent and widely spread horizons in Europe, is a marine shore deposit.

In Nova Scotia.—An auriferous conglomerate which has been worked to some extent occurs in Nova Scotia, Colchester county, at Corbetts Mills, four miles north of Gays river. It is pronounced Carboniferous in age, and lies unconformably upon the older metamorphic rocks, these last being Algonkian or Cambrian, and intersected by small, rich gold-quartz veins. According to Mr. C. F. Hartt this banket is rich for a foot or more from the bottom; the gold occurs in scales up to a quarter of an inch in diameter, and sometimes twenty or thirty scales are visible in a mass of less than a cubic inch. Sir William Dawson writes:

"The conglomerate is formed of the debris of these older rocks, and gold occurs in it exactly as in modern auriferous gravels, being found in the lower part of the conglomerate, and also in hollows and crevices of the underlying slate."

Mr. H. S. Poole writes: "In the 'runs' or hollows of the slate the bed rock is removed to a depth of 3 or 4 feet for the gold contained in the backs or crevices of the slate. The gold is not very fine and pieces of over a pennyweight are only occasionally found. Usually the surface of the grains is rough, not as though it were fresh from a lead, but rather as if each grain or piece of gold had been first smoothed by attrition and afterwards had fine particles attached to it."

In response to an inquiry, Mr. Geo. M. Dawson informs me that the conglomerate at Corbetts Mills is "evidently a fossil placer and not an impregnation. Small scales of gold embedded in it, when examined with the magnifying glass, have the rounded form usual in placer deposits, but in addition are usually evenly roughened, evidently by the subsequent pressure upon them of surrounding sand grains." The description of Mr. Poole would lead one to suppose a secondary crystallization of gold on the surface of nuggets, but if this is the opinion which Mr. Poole intended to convey Dr. Dawson dissents from it, as is mentioned above. The alluvial gold scales of the Rand, too, are probably distorted and roughened by the pressure of sand grains. Mr. E. R. Faribault has been good enough to send me, through Dr. Dawson, the following note on this interesting occurrence:

"The auriferous conglomerate at Corbetts Mills, Gays river, Colchester county, Nova Scotia, is a coarse conglomerate at the very base of the Lower Carboniferous, resting directly on the Upper Ferruginous slate group of the gold-bearing rocks of Nova Scotia. It is wholly made up of the detritus of the gold-bearing slate. Most of the smaller pebbles are well waterworn and have the form of seashore pebbles, and vary from the size of a hazelnut to that of an egg; but quite a few pieces of slate and quartz are not in the least waterworn, and these are generally much larger in size. The matrix is composed of a gritty mixture of quartz, slate, and hematite, cementing the whole very firmly. The pebbles are not, however, uniformly arranged where they are mining. This bed of conglomerate has been traced and found more or less auriferous for some four miles along the face of a ridge of gold-bearing slate, rising to about 150 feet above the level of the Carboniferous basin. A belt of quartz veins, many of them proved to be auriferous and some of them of great extent, follows the top of this ridge along a steep anticlinal fold, and its debris brought down the hill by numerous small streams have certainly largely contributed to make up the auriferous conglomerate at the beginning of the Lower Carboniferous period.

"The conglomerate has been worked by levels leaving the line of outcrop at right angles and following the gentle slope of the underlying slate rocks. The miners have noticed that the gold was coarser and most plentiful about the line of the present outcrop of the conglomerate, getting finer and scarcer the farther they recede from it. Most of the gold has been found at the very bottom of the bed of conglomerate in the matrix or in very thin flakes on the surface of the pebbles; and crevices in the slate, running at right angles to the stratification and cleavage, were found very rich, in some cases to depths of 10 to 14 feet. A shaft sunk about 800 feet distant from the line of outcrop gave the following section of Lower Carboniferous:

	Feet.
Surface drift	20
Quartzose feldsphatic conglomerate	35
Coarse sandstone	2
Coarse irregular conglomerate (auriferous)	8

"My conclusion is that the auriferous conglomerate of Gays river is a littoral deposit of marine origin."

(*To be Continued.*)

*Eighteenth Annual Report Mineral Resources of the United States.

Stamp Milling of Gold Ores in Its Relation to Cyaniding.

It has been more than once said that intelligent discussion of a paper read before a technical society is as interesting and valuable as the paper itself. In the issue of February 5th appeared an address on "The Stamp Milling of Gold Ores in Its Relation to Cyaniding," by E. H. Johnson, before the Chemical and Metallurgical Society of South Africa. At the following meeting of that society, January 15th, '98, F. White said:

The author of the paper on "The Stamp Milling of Gold Ores in Its Relation to Cyaniding," is evidently very doubtful about the gravitation stamps being the most suitable machine for preparing pulp for cyanide treatment. This latter process has effected as great a change in gold extraction as Bessemer's discovery made in the manufacture and in the extension of the use of steel. I cordially support him in his endeavor to bring about a better state of things, and hope that we shall see that stamps can be made to give something near the product required for cyaniding purposes, that is, as near as a machine working on a wrong principle can do it. Some data which I have obtained during my investigations as to the merits of different classes of crushing machines may be of use in this discussion, for they show the effect produced mechanically as well as the effect obtained by cyaniding. In reference to the results given in table No. 1, the following explanations should be made: The product from the wet crushing mill, with 900-mesh screening, contained 27 per cent of slimes which were not cyanidable. The minus 90-mesh (8,100) which was treated in the cyanide vats was therefore 37 per cent of the total. It was not found possible to cyanide the product from the dry crushing stamp until 13 of the 49 per cent of minus 90-mesh had been removed, leaving 36 per cent. The minus 90 product from the Niagara pulverizer should have been higher, probably 36 per cent, as some dust escaped from the settling chamber during the trial run when the sample was obtained. Table No. 2 gives an account of the different sizes of grains obtained in dry crushing by rolls, the different values, and the extraction obtained from each size. The finer sizes are notably the richer, due to the fact that the major part of the gold is extremely fine, and naturally accompanies the smallest grains through the finer sieves. It is not likely that a similar test made with tailings which have passed over amalgamated plates would give equal results. The difficulty experienced in getting two samples giving exactly the same quantity of grains of different sizes, make it impossible to make the calculations work out exactly in all cases. I have made a diagram which shows very clearly the different proportions of different sizes referred to in table No. 1. The line in the first column shows the amount of minus 90 product which can be present without impeding percolation. The ideal product which should be sought after is not that which gives the highest metallurgical extraction, but that which gives the best economic mean when the value of the gold won is compared with the cost of mechanical preparation plus the expenditure required to recover the gold. As an example, in table No. 2 we see: The minus 30-mesh product gives an extraction (by assay) of 84.49 per cent, while minus 90 gives 94.11. The difference, on 10-dwt ore, would be worth 46d, which would probably without difficulty cover cost of reducing the first to the size of the latter. But here we appear to have reached the economic limit, for the difference between the minus 90 and the minus 120 is only 1.79 per cent, worth say 7½d per ton, which would not pay for the cost of reducing the one size to the other. If some of the members of this society were to investigate the tailings they are treating, finding out the proportions of the different sized grains and then assay values before and after cyaniding, they would be well repaid for their trouble. Year by year the tendency is to use coarser screens in the batteries, but there is little doubt that the stamps crush an unnecessary proportion of the ore to a degree of fineness which is not required to give sufficient access to the cyanide solution, while, on the other hand, this excessive fineness is objectionable and involves increased expenditure.

TABLE NO. 1.—PROPORTIONATE QUANTITIES OF DIFFERENT SIZED GRAINS PRODUCED BY DIFFERENT SYSTEMS OF ORE-CRUSHING MACHINES.

Class of Crusher.	Class of Ore.	Mesh.	Percentage obtained which passed a certain mesh, remaining on the size following.			
			900	*1600*	*3600*	*8100*
Wet stamps	Pyritic banket.	900	5.60	12.66	17.58	64.16
" "	Chiefly pyritic banket	700	11.15	28.53	9.21	51.11
Dry "	Pyritic banket.	400	20.30	9.80	21.80	49.10
Rolls	" "	400	26.63	33.99	13.06	26.30
"	" "	500	9.30	41.85	15.38	33 47
Ball mill	" "	500	20.07	24.38	13.88	41.67
Niagara pulverizer.	" "	.....	20.17	24.30	24.30	31.23

TABLE NO. 2.—EXTRACTION OBTAINED FROM DIFFERENT SIZES OF DRY CRUSHED ORE (PYRITIC BANKET), GROUND TO PASS A SIEVE WITH 500 MESHES PER SQUARE INCH, SAY 22½ PER LINEAR INCH.

Size of Grains.		Percentage of Weight.		Assay Value.		Percentage of Total Value.		Percentage of Value.	Extraction.	Ratio of Sizes.
Passing on Mesh.	Remaining on Mesh.	Residue.	Residue.	Original.	Residue.	Original.	Residue.	Residue.		
				Dwts.	Dwts.				Per cent.	
22½	30	7 327	9.30	28.00	9.00	6.43	2.54	20.60	67.85	1
30	60	55.200	41.85	29 00	4.50	50.18	5.94	48.20	84.49	4
60	90	7.480	15.38	33.00	4.30	7.73	2.07	16.90	86.96	9
90	120	6 406	6 33	34 00	2.00	6.83	0.397	3.20	94.11	16
120	.....	23.585	27.14	39.00	1.60	26.83	1.61	11.10	95.90	....
Totals and averages.		100.00	100 00	31.83	3.415	100.00	12.547	100.00	89.25	

Concerning Certain Physical Theories.

NUMBER II.

Do the sun and planets radiate heat into space, and so cool off? All known facts indicate that no atom of matter, or particle of energy, is lost in Nature. It is unphilosophical to suppose that nearly all the energy of the sun should be thrown away and lost, unless such waste be proved. In a clock a small spring supplies all the power needed to keep the pendulum going. Imagine a 100 H. P. engine running for the sole purpose of actuating one small clock. Yet the ratio of waste is less than that believed to be going on in the solar system. The planets are supposed to receive, say, one twenty-millioneth of the heat and light emitted by the sun, and of the amount received, Proctor, after Hershel, estimates that the earth utilizes one part in twelve million millions. If on every square inch of surface of earth, both sea and land, there could be piled up 1000 copper cents, less than one-fiftieth of them would represent the proportion of sun light and heat really used, the remainder being wasted. Contrast these figures with the fact that on the earth we see only the most rigid economy. The leaf falls from the tree, the avalanche from the mountain; animals and plants live, grow and die; the winds fan the earth, and the tides beat against the rock; but in all there is no waste. Every bit of matter, or energy, is carefully conserved and used over and over endlessly. All this is true to the upper limits of our atmosphere. Beyond that we are asked to believe that there reigns the most boundless and foolish extravagance: that the earth receives daily billions of foot-tons of energy and heat, but throws it all away, and daily grows colder; that immeasurable force has been stored in the sun for the sole purpose of wasting it; that suns and stars everywhere are cooling and dying in consequence of this unnecessary waste of their resources; hence, that the Creator deliberately prefers dead and dying worlds to those ever fresh and fair. Imagine a ship's crew on the ocean tossing overboard in sheer wantonness their food, and dying in consequence. It would be the act of mad men. If the universe cools down to the absolute zero, say, 480°, then what? If human souls live hereafter, they must look forward to a condition it may be indelicate to hint at. If the fires of Hades burn eternally, they must be exceptions to the radiant heat theory, and form the only comforting prospect ahead for shivering souls. If there is a constant stream of heat to the earth and another from it, it would seem easy to stop waste by turning the outgoing stream back to the earth. Every cloud in the sky does that very thing. An extension of the process would stop all waste. But there is probably another way of doing the same—in the flow and reflow of electricity, or some other form of gravitation, which, playing between earth and sun, becomes cognizable at the terminals as light or heat. If the sun pulls the earth from a straight line to a curve, it must exert and transform energy. What becomes of this, if it does not take the form of light or heat? I consider that the above considerations constitute a demonstration that the common radiant theory of light and heat is totally wrong. But there are others. The theory is based on the apparent heat of the sun. Is the sun hot? Scientists of renown have measured sun heat with the utmost care and reached conclusions wildly discordant from thousands to millions of degrees. Heat increases with compounding difficulties. A blacksmith reaches 1500° with ease. It is hard to force a cupola furnace to 3000°. With big engines and special appliances it may be slowly increased. With electricity, it may reach 8000°, possibly 10,000°. It is not improbable that at 20,000° all elements may be vaporized, or even dissociated. We can form no idea of what 50,000° means, or whether matter could sustain such molecular motion. To talk of 28,000,000°, is to use words without meaning. As we don't know the heat of the sun, speculations, now so abundant, about age, rate of cooling, etc., are valueless. Much more if there be no cooling whatever. Light, heat, actinism, electricity and magnetism are five different things, yet all seem to travel from the sun at same speed, under same law of square of distance, and in mathematical straight lines. Rays from different sources of light must cross without confusing. If light rays criss-cross in millions of ways, what of the superposition of four other sets of rays, beside those of gravitation, atomic attraction and repulsion, electric and magnetic repulsion, and, perhaps, several kinds of X rays? A set of atoms, vibrating in these thirteen ways, and some thousands of sets of waves of each kind, all at the same time, and keeping each absolutely and invariably separate, and all in straight lines, would be almost busy. Rather let us think that here, as elsewhere, Nature produces her results with the simplest means. We see only results. In the secret place of Nature may be only one cause, one force. In the spectrum heat rays coincide with red, and actinic with violet, (beside others beyond), and should, therefore, be of same wavelength. If waves of same length produce both heat and color, or actinism and color, or even of different lengths, what is the cause of the different results? With the blind, red color, heat and base sounds are indissolubly connected, as also cold, blue and high notes. What close connection can be shown between vibrations of 256 per second and 400 million millions per second? A slight blow on the eye produces vivid sensations of color. The whole eye must vibrate; yet to vibrate ¼-inch of optic nerve at the rate of 400 million millions times per second would require a steam engine—and a large one. There is certainly a mistake somewhere in these big figures. Prof. Newcomb thinks there is a mistake in the testimony of the spectrum as to the light of comets. Absolute cold is supposed to reign in space, that heat consists in molecular motion, and that at about 460° F. all this motion ceases. If heat travels into space, how can there be absolute cold there? If the supposed amount of heat radiates from the sun, space ought to be red-hot for a long ways around. In fact, if the sun travels 150,000,000 miles per year, it ought to leave a red-hot streak in space that long. It has not yet been shown how heat (molecular motion) can travel from a cooling planet into space, where neither matter nor motion exists. Matter is said to retain its motion until it delivers it up to other matter. How can earthly matter deliver up its motion to space if there be no matter there? If, as Thompson calculates, interplanetary matter weighs one pound to 1000 million cubic miles, how could the earth deliver daily the amount of heat daily derived from the sun to such a small amount of matter? Imagine packing the heat of 100,000 Bessemer furnaces into the hollow of a goose-quill! It is vain to attempt to escape by saying the heat just passes through this matter. If this matter don't carry the heat, what does? If it carries it, it must contain it for the time. If an atom can only get rid of its motion by delivering it to some other atom, space must be filled with matter serving no purpose except for this useless heat to travel on, or means provided for annihilating this motion,—all unsupposable. If light is material, as Crookes and others imagined, it ought to show at every reflecting surface huge effects, constantly accumulating, and its blows would destroy the eye. Heat and waves, if not of same length, at least travel from the sun with equal step. The light of a furnace travels miles, its heat rods. Why does the moon look so white and bright? Men, dirt and rock, here on earth, at any distance and in the brightest sunlight, do not look either white or bright. What legerdemain is in interplanetary distance to cause such change. The earth ought to receive eleven and a third times as much heat and light as the moon, according to surfaces; but eighty times as much according to weight. The moon, as a sphere, would reflect to the earth, another sphere, when nearly overhead, an amount of light varying within considerable limits. If we take $\frac{1}{1000}$ as an approximation the moonlight would be $\frac{1}{1000}$ of $\frac{1}{11\frac{1}{3}-3}$, say, $\frac{1}{45000}$ of the amount of the earth's sunlight, according to surface, or, if according to mass, say, one-seventh of that, or $\frac{1}{315000}$. The observed moonlight has been estimated at $\frac{1}{300000}$. To go further into this would lead us too far for this paper. A sphere reflecting light would appear bright in one spot only, and dull at edges—just contrary to the aspect of the moon which, like a flat surface, seems equally bright all over, and with sharp edges. All these things are significant, and certainly seem to show that neither sun nor planets radiate heat into space, and therefore are not cooling bodies; that light and heat do not travel, *as such*, from sun to earth, and that there must be an error in the supposed number of light vibrations per second. Vibrations of, say, 100,000 per second, would dispose of some of the above objections.

W. S. PROSSER, Civil Engineer.

Auburn, Cal.

OUR present supply of strontium, principally employed in the manufacture of fireworks, comes chiefly from Germany. Lately it has been reported that a large bed of strontium has been discovered at Put-in-Bay island, and American manufacturers are looking for a decided reduction in price. One New York firm is said to import 150 tons of the chemical a year at 7½ cents a pound.

Proper Conditions of a Steam Engine.

In a recent paper by R. H. Thurston before the American Society of Mechanical Engineers he defines the proper conditions of a steam engine; the introduction of the steam invariably at as nearly as practicable boiler pressure; a sharp cut off; expansion along as nearly as practicable on adiabatic line, the steam being worked within non-conducting walls, if possible, ore in a jacketed cylinder, or as superheated steam, in the actual case of to-day; expansion terminating at a pressure which is the sum of the friction pressure shown as the total mean pressure of the "friction diagram" of the engine, plus the proper allowance for heat waste as above; sharp drop from the terminal pressure thus determined to the minimum practicable back pressure; maintenance to that minimum; back pressure from exhaust to the point at which compression begins; and finally, compression as nearly as practicable to boiler pressure. The "practical" limitation in each case will be found to be at such adjustment that to gain more, ideally, would cost more than the gained power or saved steam would be worth. Too large a steam pipe; costly experiments for sharpening the cut-off corner, or for other approximation to ideal conditions; too low a temperature and pressure in the condenser; such may, either or all, prove expensive methods of gaining higher "duty" of engine.

Whether the engine be simple or multiple-cylinder, the designer will seek the closest approximation to the ideal diagram, simple or combined, that he finds likely to give gains more than compensating the cost of securing them. Where the engine is designed to compete for a prescribed high "duty," the pecuniary limitation takes another form, which it is not our province here to consider, and the problem, in design, becomes that of approximating the ideal case in such manner as to attain maximum thermic, rather than commercial efficiency.

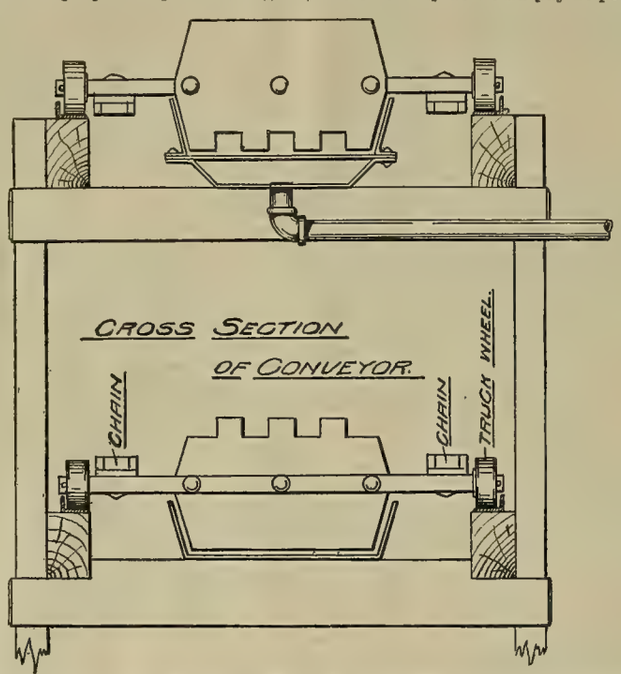
From either point of view, "drop" between cylinders is evidently not desirable, except at the point of termination of expansion in the low-pressure cylinder before condensation begins, where drop is required to the extent of the sum of the quantities; friction and cylinder condensation waste, including also, if it exists, leakage. From either point of view, also, compression to boiler pressure, with minimum "dead spaces" and minimum clearance, is requisite. In either class of engine the machine acts as a whole, and is to be treated as if the work at the crank-shaft were performed, as in the case of the multiple-cylinder engine, precisely as if it were a simple machine. When we have a variable load, the conditions differ not only from those affecting the engine under constant load, but also as affecting the two classes of engine. The problem for the simple engine becomes, in effect, the following:

Required, to secure such a design and construction of engine as will permit its operation, under varying loads, in such manner that the work performed shall always be precisely that corresponding, net, to the load imposed at the instant, and also, at the same time, so that the thermal pressure on the expansion line shall not fall below "virtual back-pressure line," as the writer has sometimes called it, computed as above. This means that when smaller loads are dealt with than that which constitutes the best for the machine as designed, a lowered boiler pressure is better than a shorter cut-off.

The problem for the multiple-cylinder engine becomes quite different from the above, for the reason, as above indicated, that the ratio of volumes of its cylinders is a fixed quantity and cannot be made alterable, as should be done if practicable with variable loads. Thus the problem involves the selection of such a ratio as will suit, not the best load of the engine, but that load which will be taken as the probably best means for the series of variations which are anticipated as characterizing the probable life action of the engine. The ratio of chosen boiler pressure to select terminal pressure ordinarily settles the total ratio of expansion and that of the cylinders, and all proportions of the engine for constant load, but this is not true when such variations of load as are daily witnessed in the operation, for example, of the power stations of electric railways. It may in this case be found that "drop" is a requisite of best mean performance, whether thermal or commercial, and new relations of expansion in cylinders in series may be best. But these are not all the new considerations coming in to complicate this question in the practical case of every-day work. It may prove so much cheaper to build, as well as to operate, an engine in which we have the equivalent, practically, of the triple-expansion engine, for example, with the intermidiate cylinder cut out, so as to make it a better dividend earner than the unmutilated triple-expansion engine. The reduced cost of construction may more than pay for the loss of efficiency, even at its best load, and with variable loads it may prove that the unorthodox form of compound may pay better than either its orthodox competitor or the triple-expansion machine. Such are the still existing problems for the designer.

Cooling Conveyor.

Herewith is illustrated a cooling conveyor brought out by the Denver branch of the Jeffrey Manufacturing Company and designed for cooling hot roasted ores preparatory to storing in wooden bins or other disposal. The hot material is conveyed through the upper run with notched scrapers to thoroughly agitate the material and expose it all to the cooling action of the water jacket which forms the bottom of the conveyor trough. After traveling the entire length of the upper run of the conveyor the cooled ore discharges into the lower run, by which it is returned, and may be drawn off into bins by slide gates suitably arranged at desired points. This device is intended to save labor and be an economizer about smelters and reduction works where it is necessary to cool the roasted ore for future handling. The same form of conveyor is introduced for drying purposes in concentrating works, the bottom of the conveyor trough in this case being made of boiler plate of sufficient strength to withstand the steam pressure used for heating. Sometimes the construction is simpler, the heating being effected by having a fire directly under the trough, dispensing with the steam.



Wastefulness of Old Machinery.

In a recent address to a society of engineers, W. Beaumont dwelt upon mechanical motive power as the greatest source of the increased prosperity of all countries during the past sixty years. The most important of all the applications of the steam engine had been as the means of transport of men and materials and as the means of obtaining material and manufacturing things which acquire their value through transport. The advances made by the introduction of the steam engine and many of the machines which followed in its wake were so great that in many industries and manufactures engineers for a generation or more were employed in construction on what have now become old and unprofitable lines. Even to-day there are in use in mills, manufactories, steamboats and railways many old well-made steam engines which are costing in fuel from 25 to 100 per cent on the outlay necessary for the introduction of modern engines. The gas engine is old enough now to make it worth while to scrap many of the earlier forms which are still working perfectly, except that they are consuming from 30 to 50 cubic feet of gas per horse power, instead of from 15 to 20.

The reluctance of the worshipping owners of old but wasteful machinery and plant is shown in many mills where twice the necessary amount of power is used for mere transmission, where two machines are employed and have to be driven to perform the work of one, where boilers are costing as much every year for disincrustation, boiler compositions, and decreased evaporative efficiency as would pay 20 per cent on the necessary outlay for condensers or for water softeners.

We see this reluctance in factories where badly balanced machinery, or machinery almost impossible of balance, is consuming a lot of power in setting up harmful and annoying vibration in buildings, and in the enormous waste of time and money by the use all over the country of double the horse power that would be necessary for cartage if anything but antiquated notions prevailed as to the construction and maintenance of roads and of the vehicles that run upon them.

We also see it in the continued use of tramways in towns, which are metallic admissions of the badness of our ordinary roads, and of the great saving that will be possible when universally good roads and horseless vehicles predominate.

The recent advances made by engineers in the different branches of the profession, and the ready adoption of many of the improvements resulting from them by our competitors abroad, are making it necessary for engineers and those who employ them to get rid of many of the old machines and methods and to give a more attentive ear to the man who can do these things, and pay less attention to the obstructive critic, whose own practical incapability leads him to prove that these things cannot be done.

Strenght of Hardened Cast Steel Spheres.

A series of experiments made with hardened cast steel spheres, to determine their resistance to crushing, is described by A. Foeppl in Baumaterialien Kunde. Tests of this kind are not easily nor usually carried out. Following is a description of the methods employed:

It was impossible to crush the spheres between the two flat surfaces of the regular testing apparatus, as no plates could be obtained which were hard enough for the purpose. Tests with the ordinary hardened steel plates would cause more damage to them than to the balls they were supposed to crush. The observations made in a former series of comparative tests of steel balls, that the same materials give comparatively higher results for smaller diameters, was substantiated in this set of tests also. An investigation into the causes for this shows that in reality the plates are tests and not the spheres, for the plates making the contact during the operation are indented to such an extent, that if sufficiently soft a hard steel ball may be embedded entirely. Results thus obtained must naturally be enormous.

To overcome this difficulty arrangements were made to test two spheres together, each being embedded carefully in plates bored out for the purpose, so that no damage could result except at the point of contact of the two spheres. This method gave reliable results, for tests made thus gave a compression of 5 to 6 tons, while a ½-inch ball of the same material, placed between hardened steel plates, ran up to 13 tons, and crushed into them one-fifth inch before breaking. The flattening of the balls was also observed, one of each pair being blackened before the test was made. By putting on constantly increasing loads, and turning the balls to obtain new contact surfaces, interesting results were obtained. As the spheres tested were not of the exact size prescribed in the standard specifications current for this work, experiments were made to arrive at comparative data. It was found that the accepted formula according to which the apparent hardness is proportional to the cube root of the radius of curvature gave concordant results. The data could, therefore, easily be calculated to conform to the standard 1.6-inch diameter sphere.

It is to be understood, however, that this applies only to the same grade of material. As there is nothing known about the relation of a cylinder to a sphere so far as their crushing strength is concerned, a series of experiments was conducted to supply this hiatus. Cylinders were cut from copper rods, spheres were turned from the same material, and both sets of test pieces thoroughly annealed. The results show that the figures obtained from the compression of spheres are two-thirds of those obtained from testing the corresponding cylinders. A series of tests of the hardened steel balls follows, the conclusion derived being that the various makes run fairly uniform, varying between 380,000 and 418,000 lbs. crushing strenght per square inch, the average being 396,000 lbs. The highest results ever obtained by the author of the paper was 483,000 for hardened tool steel. When it is remembered that excellent steel rails do not run ever 162,000 lbs., hardened steel balls are probably the best material for resisting compression now known. As a consequence, attention should be paid to the beds they rest upon when designing and constructing machinery.

A further test was made to ascertain the resistance of these hardened steel balls to impact. Suitable weights were allowed to drop from varying heights upon the balls until they broke. Each test was recorded and from the data obtained the work required to produce fracture was calculated. Finally the resilience of the material showed much greater variation than did the crushing strength under plain compression.

Mining Summary.

CALIFORNIA.

Amador.

Work at the Amelia mine is progressing, the shaft having reached 480 feet. Water is coming in fast and causing some bother.

The Anita will sink to the 1000-foot level. This necessitates more powerful machinery, which will be put up soon.

At the Amador Queen No. 1 the shaft is down 880 feet and Supt. Dye is going down until he proves his theory that depth will develop a large and paying ledge.

Davis & Marsh struck a good prospect near Butte Mountain last week.

Several men went to work at the Lincoln mine last week and things are being put in shape so that opening up the old shaft can begin at an early date. Nearly the entire 100,000 shares of stock has been disposed of.

At the American mine at a depth of 100 feet they are under a chute of ore between 200 and 300 feet in length and the ledge is 7 feet wide. The mill will start in a short time.

Sinking was completed at the Oneida mine last week to the 1500-foot level and a drift started for the vein, which it is expected will be reached in 200 feet.

The Amador *Record* says: With the Wildman-Mahoney, Baliol, South Eureka, Central Eureka, Oneida, Lincoln, American and Potazuba mines in operation and 150 stamps grinding, Sutter Creek never in her history had a more encouraging outlook for prosperity.

A. Mello, on the Silver Star mine, near Jackson Gate, is sinking a winze in the ledge at the end of a 160-foot tunnel.

Dispatch: Mrs. M. J. Hepburn of Chicago has made an agreement for the purchase of the Bellwether mine, at Jackson, for the sum of $98,600, and paid $2600 on the purchase price. Mrs. Hepburn's plans for the development of the mine are on an extensive scale.

Butte.

Gramps Bros., at Big Bar, have found a streak of pay dirt; Faley and Smith, on the North Fork, took out $97 in three weeks.

Eastman & Avery discovered a ledge half a mile east of Kanaka Peak, and are running an open cut.

At the Morris Ravine mine, fifteen men are employed.

At the Magalia sixty-five men are employed, and the mill is kept steadily running on cement gravel.

The shaft on the Emma mine, at Nimshew, has reached 120 feet.

The Princess Company is reported to have bought the Butte Queen property. Orders are said to have been received to open the Golden Summit mine, and the work of pumping will begin as soon as the machinery can be put in readiness.

The Ethel, or Wylie mine, has closed for the time being.

The John Hupp mine shows good gravel.

Good rock has been struck in the Miller mine, near Powieltown.

The Bader mine, near Oroville, is paying, and fifteen men are employed.

On the 22nd ult., in London, the Golden Feather (Ltd) was wound up, and a new company—The Magalia Con. G. M. Ltd—organized, to work the newly acquired property near Magalia. What transpired at the meeting is of interest to California miners. J. T. P. Pechly, the chairman, referring to the circular proposing the action taken, said: "It contains on the one hand a frank acknowledgment—and it is with deep regret that I have to say it—of a complete failure so far as the working of that portion of the Feather River, which we have been attacking, is concerned; and, on the other hand, a proposition, by the adoption of which, we think, we may have a fair chance of redeeming our position and retrieving the losses which we have made. Whilst we feel very sore under these losses—and on none have they fallen more heavily than upon your directors—I cannot help looking back over the past and asking myself how it is that we have been so utterly misled in all the anticipations we have indulged in with reference to this undertaking. It seems to me that the keynote of our failure may be found in the second paragraph of the circular. 'From the very commencement of operations in the Feather river the shareholders have been fully aware that the claims owned by the company had been more or less worked by the Cape and Cape Union Companies in 1857 and 1858. Up to the present, however, it has been the subject of general belief, both in California and on this side, that they had only been partially worked, and that a large amount of virgin ground remained intact.' Gentlemen, that belief is the rock on which we have come to grief. I think that it is due to you and to ourselves as directors, that we should for a moment or two look back over the past and see how we began to cherish that belief—how we came, in fact, to form this company in the first instance. I will ask your attention for three or four minutes whilst I look back to the foundation of the original company for working this enterprise. Some 45 years ago all California was ringing with the wonderful discoveries which were being made on the Feather river. The echoes had not died away even when I was mining there in 1862–64. We used to sit round our fires at night and talk of the enormous returns of gold that had been taken out of the various bars of the Feather River, and the ravines and gulches adjacent to it. The Cape Company and the Cape Union Company in 1857–58 managed, even with the primitive appliances of those days, to turn the river, and it is a matter of history that they took out enormous quantities of gold. Each year they were driven out, as we have been, by winter storms. A few subsequent attempts were made to work the river, but they all proved unsuccessful. Then came the era of hydraulic mining, when the river, which runs, as many of you know, between rocky banks 40 ft. and 50 ft. high, became entirely filled up with debris from the hydraulic mines, and that effectually precluded any possibility of working the river bed with the appliances they had then. But during all these years, between 1858 and the year when we took hold of it, a belief had gradually sprung up in California—which we know now to be utterly unfounded—that the Cape and Cape Union Companies had left a large amount of their ground untouched. The other day I turned up in my office a book published in California in 1885—that is five years before there was any idea of working the mines by English companies. I found the following passage: 'A plan has been projected for working certain deposits in the vicinity of Oroville, which if carried out will probably prove successful. It consists in the construction of an irrigating ditch of a capacity sufficient to carry the entire flow of the Feather river, at low water, from a point a point about two miles above Oroville. The water to be handled during the five summer months is from 40,000 to 50,000 miners' inches, which will be distributed over a large area of land in Butte and Yuba counties, now comparatively unproductive. Taking the water into the canal will make it possible to work several miles of the channel river, which is believed to be very rich.' * * * There, gentlemen, you have the belief which had sprung up in California at that time. Then every one of the shareholders was content to receive Mr. Hall's report. We had also a very excellent report from Mr. Hendricks, the Secretary of State out there, and another from Mr. Perkins, the ex-Governor of the State. We also had an endorsement of Mr. McLaughlin by Mr. Edison, who is well known to all of you. I was not, however, altogether satisfied with that, and I had a friend in California, a member of one of the leading firms in San Francisco, and a gentleman to whom I owe whatever success I had in life. I wrote to him, knowing that he would not put me wrong if he could help it, and here is his reply. It is dated Aug. 6th, '90: 'I think you have a good property if you can keep the river bed dry for any good length of time. The Feather river is apt to become a raging torrent in a very short time. It all depends on that. Along with some friends I was interested in an attempt to get into the gravel bed opposite Oroville. We sunk a shaft on the river margin, erecting air compressors, and thought we could, by filling a shaft with compressed air, get into the rich gravel under the river, but it was no good. We got into the gravel and found it rich in gold, but we could not keep the water out; so we lost our money.' Now, gentlemen, on behalf of your directors, I may say that we have no wish to shirk responsibility in connection with this enterprise. I have always maintained, and I do so still, that we took every step that could possibly be taken to ensure our not making a mistake when this company was formed, and we were perfectly justified—and you, too, felt at the time that we were justified—in accepting Mr. Hammond Hall's report, and in believing that there was a very large amount of this river bed which had not been worked. And there is plenty of it yet. We have 2000 feet below our foot dam, which has never been touched, and Mr. Evans thinks it is a very good piece of ground. The unfortunate thing is that the upper part of our property, which is covered by the Cape and Cape Union claims, has undoubtedly been worked. All I can tell you, gentlemen, is that our faith continued strong right up to the very last." * * *

"A proposition was made for amalgamating with the Golden Gate Co. and raising money to work their piece of the river bed, which has also never been touched. When we came to go into the matter, however, with some of the largest Golden Gate shareholders we found that they were not willing to come in. They are working a valuable property and they did not see why they should hand over two-thirds of their property to us, and at the same time be asked to find money to meet the very considerable cost which would have to be incurred in opening up the Golden Gate property. We had one or two other propositions, but nothing that we could look at until this proposition was made to us, which is referred to in the circular. You will naturally want to know something about the history of it, and why such a property is offered to us at such a low price. Mr. Harvey and Mr. Kirkpatrick, my colleagues, were out there six years ago, at the time when the Magalia property was being worked by the Magalia Consolidated Co., and they saw this incline of which Mr. Evans speaks in his report, and they saw some of the gold taken out. Three years passed by, and the property was closed down, for reasons which are also stated in Mr. Evans' report. Mr. Harvey happened to be out there again, and he thought very highly of the property; he therefore managed to acquire on behalf of a small syndicate a controlling interest in it for 4000*l*. I have seen the receipts, and satisfied myself that that was actually so. The syndicate which took it up paid 4000*l* for it, but they did nothing with it, because they could not get the remaining interest. It was only a few weeks ago that they were able to purchase the remaining interest, and so to control the whole of that property. They propose to hand it over to us for about the sum which it has cost them. I am very sorry that Mr. Harvey is unable to be here to-day owing to illness. He writes me as follows: 'I am sorry I cannot be present at the Feather meeting to-day. As you are aware, I have been ordered down here by my medical advisers through illness contracted when in California on the company's business. The property offered to the Golden Feather, Limited, I believe to be a thoroughly proved good one, and I say this from personal inspection. The members of the syndicate (of which I am one) are very large shareholders in Feathers, and have offered the Magalia mine at such a low figure as they feel sure they will get a very substantial profit from their holdings in the Feather Co.' I may tell you also that of this £5000, I believe £2500 will come back to the new company in calls on shares held by the members of the syndicate in the Magalia property. So that I do think that is a very favorable offer to make to us—to give us this property for the exact sum which it has cost them. Now I do not think you want me to say very much as to this Magalia property. Mr. Evans has given a very full and exhaustive report on it and I am sure you have all considered it thoroughly. You will notice that the report is dated two years ago. I cabled him to know if he could confirm it now, and he replies: 'I am very glad to inform you that I can confirm report Magalia Con. made by me in the year 1896. Results of recent prospecting fully warrant confirmation.' The only point I wish to notice in the report is on pages 4 and 5, where he quotes from the twelfth annual report of the State mineralogist—a perfectly independent report. He says: 'The claim embraces about 400 acres of patented ground. Several tunnels have been driven under the lava capping, reaching a distance of 1300 feet, and disclosing an extremely wide body of gravel. The pay extends throughout the gravel right up to the lava capping. The bedrock is partly slate, partly sandstone, the latter fossiliferous. To work the ground or gravels successfully a deeper bedrock tunnel is required. The present cost of extracting a carload of gravel is 40 cents, the total width of gravel is half a mile.' I think, gentlemen, that speaks for itself as to the extensive character of this property, and I am going to ask Mr. Kirkpatrick to say a word or two to you as to what he saw of the results of some work carried on at the property. He saw some wonderful returns, but we must not think that they represent the average of what is to be found there. Those of us on the Board who are not connected with this syndicate have decided, so far as our own interests are concerned, to accept this proposal to form a new company, and we are met here to give effect to it if you think fit. We have communicated with the whole body of shareholders and have received 540 proxies, representing a total of 145,423 shares in favor of the reconstruction and the purchase of the new property. I will not detain you any longer. If you decide to support us in carrying out this reconstruction, I think that we shall have a fair chance of recouping ourselves for the losses we have sustained in the past; and I am sure no one will rejoice more than I shall, for none of you can imagine the worry and anxiety that this company has been to me during the last few years. No one will rejoice more than I shall if we can make a success of this Magalia property. I have now to move that the resolutions which have been submitted to you be and the same are hereby adopted, and I shall be glad if some shareholder on the other side of the table will second the resolution, because it will be a mark of confidence in us."

Mr. Kirkpatrick said: "When I went to see this property it had been discovered about two years. It was in a flourishing condition, and there was no chance of it coming on the market. The notes that I made at that time were not, therefore, taken with any idea that it would come into the hands of the Feather Co. I drove there from Oroville—about three and a half hours' ride over an excellent road, and we reached the mine, from the lava-cap, by a mule trail some 600 feet down. At that point there is the gravel, about 4 or 5 feet thick, and from that there is 800 feet of sandstone right down in the gulch. The gulch is scooped out for about four miles from Magalia down into the plain. It is about half a mile wide, opposite the miners' house down on the gravel, and it was only discovered by an accident. The Pershbaker mine, two miles up the hill, was doing splendidly on the same gravel. It was supposed to go somewhere down the mountain, but no one could tell where. Two winters previously an immense avalanche of debris covered the face of the mountain, and 10 inches of gravel were seen on either side. Several miners immediately pegged it out, and when I was there they had driven six tunnels into the gravel and had found that it was immensely rich where they struck it; and the appearance of the gravel inside, which was really the turn of the river under the mountain, showed that it was running away from them a very considerable distance. Then they went below and ran in 1500 feet, and located the entire line of the gravel; so that there is no question that the gravel is there. The water with which they worked it, which is about 300 or 400 inches, comes within twenty yards of the mouths of these tunnels, the gulch goes down 800 feet, down which runs their sluice; then there are three boxes of about 12 feet long, then the fall and another three boxes, so that by the time it reached the bottom of the gulch every bit of the cement was broken up and the whole of the gold was saved. I saw them put in three carloads and I had the first three boxes unlocked and I took out twenty ounces of gold. Of course, it is not going to run anything like that all through when it comes to working it, but it is unquestionably enormously rich. These mines are an old river bed, and it is from them that at the present time a great part of the gold in California is got. The gulch below contains an enormous quantity of gold, which evidently came from the river, and was broken down by the gulch when it was formed many years ago. The only difficulty in dealing with a gravel mine of this sort is to get it free from water, because these drifts are practically underground drains and they take a great deal of surface water. Here you can go in at a gradient which will take out the whole of the water by gravitation, and it will not cost £2000 to get a tunnel in there. There is not another difficulty in working the mine so long as pillars are left as supports. When I left the mine I observed that they had not left a pillar all the way through, but had taken every morsel away and put in a lot of small green timber. As we came out, my companion turned to the man who was working there and said: 'You will have the whole of this down upon your heads before you are three months older, if you are not more careful. It is so rich that you are getting careless, and you will lose the whole mine.' Within three months from that time the mine caved in. You have heard from Mr. Pechey how we managed to get hold of it, in order to offer it to the Feather Co. If you agree to the proposals now before you, I think you will get a splendid return from this property. The Pershbaker mine returned over £100,000 last year, and it is only two miles higher up than we are."

Calaveras.

Prospect: The development at the Sugar Pine mine, near Murphys, is a shaft 40 feet in ore 4 feet wide. A tunnel taps the vein at a depth of 150 feet, exposing the lode 4 feet wide.

The Buckhorn is being worked with success, several crushings yielding satisfactory returns.

F. W. McNear continues operations in the Heinsdorff ranch. The shaft has reached 100 feet depth.

The Lone Star mine, after a clean-up of something over 500 cars of gravel, which resulted satisfactory, contemplates sinking a new shaft, as they struck water and more than they could handle.

Chronicle: The shaft at the Esperanza mine is down 900 feet and will be sunk 100 feet deeper before the mill is started. The lead was crosscut at the 500-foot level and found to be 63 feet with ore that would go $3.50 per ton in free gold, and sulphurets at the rate of $50 per ton. At the 700-foot level the lead was again cut and found to be a little wider than at the 500 level, with the ore increasing in value and the sulphurets of a higher grade, and at the depth of 900 feet there is still an improvement for the better. The Esperanza is the first and only mine in the extreme northern end of the county to obtain any depth. The mill will be started about the first of May.

El Dorado.

(Special Correspondence.)—The Grand Victory, I am reliably informed, on the 400-level came into a 25-foot ore body that will average $11 per ton.

The Crown Point, one and one-half miles south of Diamond Springs, and the Lone Star in the same neighborhood, have started energetic development work, under bond to a Scotch company.

The old Springfield, now known as the Union, is repeating its history. Hayward & Lane had worked this to a depth of 1700 feet, extracted several million dollars, and abandoned it. Rather recently Judge Williams and A. Harpending took this cast-off mother lode proposition, erected a 20-stamp mill and are taking out ore that runs nearer over than under $100 per ton.

The Salt Lake people who agreed to begin work before May 1st on the Pacific group have surrendered their bond.

Grizzly Flat, twenty-six miles east of Placerville, is taking on unusual activity, both in resuming work on abandoned mines and in developing new properties.

Power drills have been put in the Limpensel mine, adjoining Placerville, and sinking will go rapidly forward. The property is worked under bond by J. C. Diamond and Dr. Gehricke of San Francisco.

The Noyes property, held by W. H. Meyers under assignment from F. B. Lloyd, has been bonded to F. H. Hall of San Francisco, and active work has begun.

Placerville, March 15th, '98.

T. French of Volcanoville is taking out good pay gravel.

T. Carey, Volcanoville, is crushing some high grade ore.

Nugget: The Gopher-Boulder, at Kelsey, is running fifteen stamps and employing ten men.

J. Thorsen is opening a property at Kelsey.

Kelly & Ball, at the Big Sandy, have six men employed.

Democrat: A mill test of ten tons of average rock from the mine of G. F. Zentgraf yielded $14 per ton and sulphurets of unknown value. The rock came from a 60-foot shaft on a ledge averaging 12 inches in width.

Kern.

The *Rand* says that Lucky Baldwin will soon open his mine on Red Dog hills, between the Pinmore and Val Verde.

The new dryer and separator have been placed at the Wood concentrator at Johannesburg. The rest of the machinery will soon start on ore.

The Red Dog mill, at Johannesburg, is in operation.

The Panamint furnishes a discovery said to run $2000 to the ton. The vein is 14 inches wide.

The Butte mine at Randsburg is again producing.

The Petaluma mine, a few miles west of Randsburg, is paying well.

The Napoleon, in the Stringer district, is down 160 feet with $100 ore at the bottom.

The new mill of P. Quinn began work last week.

The Wedge is sacking $500 ore at the 100-foot level.

The Yellow Aster Co. produced last month $36,000 in gold, which makes the total product since December $67,500. They are dropping twenty-eight stamps night and day.

The Gold Point is down 100 feet and turning out good ore.

At the Comet and Star there is a quantity of ore on the dump, assaying from $8.50 to $126 per ton.

The Uncle John and Desert King are producing ore, some going $100 per ton.

The ore from the World Beater, near Ballarat, averages $30 per ton. Twenty men are employed.

A milling of sixty sacks from the Cooper mine yielded $600.

Los Angeles.

The Southwestern Smelting & Refining Co. has incorporated; principal place of business,

Los Angeles and San Pedro; directors—M. W. Clay of McElhaney, Mo.; L. W. Morgan of Los Angeles, E. H. Rose of Colton, D. T. Jackson of Kansas City, Mo.; E. H. Grunell of Riverside; capital stock, $500,000; subscribed, $300,001.

Mariposa.

The Santa Rosa mine is being worked.

The Compromise mine, being worked by the Hilliards and H. Hedges, has 400 tons of rock on the dump.

Napa.

The Redington quicksilver mine of Knoxville is shipping 100 to 150 flasks of quicksilver each month.

Sentinel: During February the following number of flasks of quicksilver were shipped from the various mines: Napa 600, Ætna 300, Mirabel 58, Great Western 30; total, 988. This is a decrease of twenty-five flasks over the previous month's shipment.

Nevada.

Herald: L. Loupe, principal owner of the Eagle Bird mine, Maybert, informed the lessees that the company had decided to pay off the liens and other indebtedness against the mine and cancel the lease. It is said the company will operate the mine, backed by Eastern capital.

Tidings: C. Rosenthal has bonded the Pine Hill mine, near Grass Valley. Hoisting machinery and a mill are contemplated.

Transcript: Development work shows good results at the Round Mountain and Comet mines. The drifts have been extended east and west and the ledge continues strong.

Tidings: One of the new mines opened up this year is the Grant, adjoining the Idaho. A 5-foot ledge has been encountered which shows a vein of 24 inches of good rock.

Herald: Work has been resumed on the Home mine. It will be operated through a drift from the 320-foot level of the Cadmus. The Cadmus mill has been running on ore from both mines.

The Nevada City *Herald* says that work was resumed at the Spanish mine at Washington last week, with P. R. Bradley, Supt.

D. Johnson is developing his claim near Washington.

D. P. Stewart has put men to work on the Donohue ledge, and intends erecting a 2-stamp mill there this season.

F. Meister has made good progress at his claim on Canyon creek and is working an arrastra.

H. S. Walters of Washington and M. McSorley are doing work on the McSorley ledge at Omega, and will build a 2-stamp mill there.

Placer.

A crushing of 100 tons of ore from the Bellevue mine at Ophir paid at the rate of $33 per ton.

Sentinel: Adams & Sprague are developing a quartz ledge between Auburn and Newcastle. A shaft has been sunk 82 feet and a drift run 14 feet. The ledge is from 8 inches to 4 feet in width.

The extension west of the same ledge is being worked by C. T. Adams. The ledge at this point averages 3 feet. A shaft has been sunk over 200 feet. At the 100-foot level drifts have been run 150 feet west and 200 feet east. From the 200-foot level the drift east has run 50 feet and the one west is in 60 feet. From a milling test the ore has returned a value of from $9 to $14 per ton.

The February statement of the Pioneer G. M. Co. shows as follows:

	February.	*June 1 to Feb. 28.*
Value of gold bars.....	$14,161	$105,488
Total expenses.....	5,823	52,563
Net income.....	$ 8,338	$ 52,925
Tons rock crushed.....	949	6,131
Av. value rock per ton..	$15 06	$17 21

Plumas.

Bulletin: G. W. Gaberel is making good progress in developing the Butte Bar mine. A quartz vein 7 to 10 feet wide has been uncovered and 2 feet of this is reported to yield good assays.

The Little California mine, six miles below Butte Bar, is running five stamps on good ore.

A. H. Rood has begun work on his gravel mine at the head of Bear creek.

Riverside.

In the Cahuilla district prospecting is lively and much development work is going on. The recent storm furnished a supply of water for the summer.

F. Dunham discovered a ledge of gold-bearing quartz on the Mojave desert, five miles north of Bagdad. The ore is free milling, running from $25 to $28 a ton, and carrying copper and iron.

San Bernardino.

J. I. Crowell of Corona, representing Eastern corporations, is said to have secured a copper deposit midway between Daggett and Randsburg, comprising 133 claims. The ore runs 17 per cent copper, about $11 gold and $13 silver to the ton. They will develop the property and erect a 100-ton smelter.

Sierra.

(Special Correspondence.)—In last week's issue appears an item from a Nevada county paper noting the recent rich find at the Plumbago mine. I am enabled to give you precise information on the subject from personal knowledge. The Plumbago mine, owned by the Crœsus G. M. Co. of New York, is generally referred to as a pocket proposition. While the property has from time to time produced rich pockets, it has, none the less, a defined 2-foot ledge in serpentine and slate walls and operates a 10-stamp mill. The mine is across the Yuba river from Moore's Flat and about five miles from Alleghany. It has produced upward of $300,000. The last find consisted principally of three pieces, the largest weighing 70¼ pounds, for which I saw a check from Selby,[1] dated March 11th, to amount of $9,582.81. The other consisted of 51½ pounds, which netted $3612.50.

California can still hold out inducements for the successful investment of capital in mining interests that are neither in snow-bound nor ice-capped regions.

Forest, Cal., March 15th, '98.

The Claybank Co. at La Porte is running the main tunnel at a rapid rate.

McMellan & Gray have started the Rising Sun mine, near Sierra City.

Shasta.

The Hedge Creek mine, near Mott, has a tunnel on the ledge 90 feet, in ore all the way. The ledge is 5 feet wide and carries from $9 to $21 in gold, some copper, and also galena and silver.

Graham and McDaniel are developing a quartz lead near Muletown. The vein shows a width of 4 feet and assays $96 in gold per ton.

L. F. Barlow, in the Summit mine at Sunny Hill, will run 300 feet of tunnel in addition to the 500 recently completed.

Desmond Bros. are pushing development work on their quartz location two miles north of Whiskytown.

A discovery is reported at the old Hansen mine on Mad Ox creek.

Williams & Winklereid have discovered a back channel gravel deposit on Mad Ox creek.

The *Free Press* says that the Old Spanish Co. will erect a 10-stamp mill on their property. Among the owners are H. Deakin and G. Taylor of Anderson. The company owns the Wiser property near Lower Springs, which consists of 160 acres, upon which there are a number of quartz leads. The company has done considerable development work.

The Central mine in the old Diggings district, under lease to R. G. Hart Sr., has closed down.

Democrat: G. McDaniels at Muletown discovered two parallel ledges, one of which is 4 feet wide and of good value.

At the "24" mine, owned by the Graham Co. near Shasta, they are running a 75-foot tunnel to tap the main ledge.

Siskiyou.

The Fort Jones *Reporter* says a pay chute has been struck in the Little Queen mine at Mugginsville. A tunnel was run in ore 100 feet. Sixty feet of it is high grade, with a vein 1 foot wide.

The heavy rain lately has afforded water for the miners along the Klamath and adjacent streams, and all the mines are running.

C. Jensen, on McKinney creek, is piping on a bank of 15-foot gravel.

Phelps, Osmond & Sperry purchased the Mullen mine, near Oak Bar, and are driving a tunnel to tap the back channel.

The American Bar M. Co., at Hornbrook, is preparing for extensive work this spring.

The Jillsen mill, at Hornbrook, shipped a $1200 bar last week.

Kingery & Hay, in Quartz Valley, continue to find good ore.

T. Austin, in Humbug gulch, is running a tunnel through the mountain on the west side of Yreka, and found several large stringers of quartz at a distance of 290 feet in the hill.

The Chinese Co. working the Benz Bar mine at Honolulu, purchased for $5000, has been taking out considerable money.

The Spengler Bros. are washing up ground left from last year's working on Humbug creek, and will not be able to do any hydraulic mining unless there is rain or snow.

Journal: The Colorado Co., working the Hegler mine, on Humbug, under option, sunk a shaft 75 feet and found good prospects.

The Boyle mine, on north fork of Humbug, will start again next month under the superintendency of J. F. Boyle.

The Wright & Co. claim at Oro Fino is working with a good supply of water.

Tulare.

The Porterville *Enterprise* says J. W. G. Forbes of Glendora is negotiating for the purchase of the Talc mine at White River. Should Mr. Forbes succeed in getting the property he will sink a shaft 200 feet deep, put up a new mill, two concentrators and a cyanide plant.

Tuolumne.

At the Belle mine, Tuttletown, drifting on the 300-foot level has been going on for three weeks past. Sinking in the shaft, which is 340 feet, will be resumed next week. Supt. Blake has commenced development work on the Mullen claim, adjoining the Belle, which was recently bonded by the Belle Co.

The Providence M. Co., near Summersville, will expend upward of $100,000 in putting in improvements, constructing roads, purchasing new machinery, etc.

On the Hiyaphoo a good ledge has been opened. Aside from the free gold it runs well in sulphurets. It is a combination milling and pocket proposition.

Thirty men are employed at the Sell mine. The new 10-stamp mill has commenced.

J. Arnold has bonded to C. L. Lang the Paduch ground, which runs parallel with the Rawhide and Rappahannock mines. Work is to start soon to open the property.

Independent: The Von Tromp, above Columbia, gives indications of worth. A 3-stamp mill was put up for prospecting. The ore is free milling.

At the Grey Eagle, near Columbia, purchased recently by the Korbel Bros. of San Francisco, the new mill has started.

The Norwegian mine, closed down several weeks ago for want of water, is again in operation. A gasoline engine supplies the motive power and twenty-five men are at work. Men are laying a foundation for compressors that are to operate power drills.

The Sonora *Banner* says another discovery has been added to the list on the east belt in the Schaffer mine. The development shows a vein 5 feet bearing its gold entirely in sulphurets, which reaches the sum of $1600 per ton.

While enlarging the tunnel at the Sell mine a body of high-grade ore was discovered.

The Grizzly mine, reopened last year under bond, is bought by the bonders and is to be developed on a large scale. The owners are mostly San Franciscans. At the first annual meeting last week W.C.Murdock was elected president, and W. E. Brown vice-president.

A 20-stamp mill, hoist, etc., will be built.

A new shaft has been sunk in the Grizzly 350 feet, and at the 200 level a drift run 180 feet. The vein is 8 feet wide and mills $8 to the ton. The board decided to continue sinking. So far about $13,000 has been spent.

At the Norwegian, worked last year with good results, work stopped Jan. 1st because of lack of water. Operations have been resumed with a gasoline engine, drills and air compressors operated by gasoline. The Norwegian shaft is down 350 feet.

The Santa Ysabel is running twenty stamps and there is sufficient water on hand to run its full number right along.

The Central ore chute is said to be especially good, while the Knox & Boyle and Mascot chutes continue about the same.

The Santa Ysabel earned sufficient to pay operating expenses while the property is in a state of development. The management expects to cut its three principal ore bodies in the 500-foot level, and reach this level within six months. It expects to reach the Nyman ore body on the second level. This ore body has been found in the adjoining property and is known to exist in the Santa Ysabel.

Yuba.

At the Good Title mine, Indian Ranch, the new incline is down 250 feet and work on new levels has commenced. The ledge at the bottom of the incline is 8 feet, and fifteen stamps are crushing, with a fairly good yield.

NEVADA.

At Elko C. Adams paid $4000 cash for one-third interest in the Gold Bug mine at Tennessee Gulch.

A Colorado company has taken an option on Weston's copper mine at Lone Mountain.

The Golden Eagle M. Co., in the belt north of Winnamuck, will have a plant for its milling ores. Two carloads of gold ore is in transit, which is the first shipment undertaken since last fall.

The Potomac shaft, near Mountain City, is down 120 feet in solid formation.

The Glasgow and Western Expl. Co. made a $30,000 payment, in advance of maturity, on the Star and Graybird mines at Cherry creek.

A trial run of the smelter at Golconda was satisfactory, and it will henceforth be in operation, putting an average of thirty tons a day into bullion and matte.

The Lyon County *Times* says W. and F. Armstrong and W. Boyce have been sued by Jane Laity of Virginia City for the possession of a mining claim in Silver City, known as the Lucky Star. She asks for a perpetual injunction and $2500 damages.

The Elko *Independent* reports the finding of copper ore near Lone mountain. The ore body is 4 feet wide, estimated to run 40 per cent. In addition to the copper, the ore carries from $12 to $40 per ton in gold and silver.

The owner of the De La Mar mine is giving 300 men employment and paying a tax on gold bullion of the net value of $2,500,000 that is produced annually from the mine.

A ledge has been found on the Golden Era mine, in Jumbo, yielding $40 in gold.

The Brodek mine, Silver City, from twenty-five tons of ore produced bullion valued at $658.03 in gold and $30.10 in silver.

The Glasgow and Western Exp. Co., operating at Cherry Creek and Golconda, have begun marketing ore, which consists of several carloads from Golconda that shows 125 ounces silver, 21 per cent lead and $7.70 gold per ton.

The Kinkead mill at Tuscarora is crushing sixty tons daily from the Dexter mine, giving returns of $26 in gold and six ounces in silver. The mill produced $13,000 in February.

OREGON.

Development in the Ashland & Mattern group, near Ashland, is progressing, thirty men being employed.

The Baker City *Republican* states that the Bonanza mine has a ledge 127 feet wide and not yet found the foot wall. There is no waste ledge matter. E. Geiser, one of the owners, says the 20-stamp mill will be increased to 120 stamps.

The Union *Republican* says that N. B. Merritt, representing the Eagle Creek D. Co. at Eagle Creek, will build a ditch three and a half miles in length to carry 1200 inches of water, with a fall of 300 feet. From the lower end of the flume a 19-inch main pipe for 250 feet to the Y, and two 12-inch pipes 1200 feet, will be laid, and two giants will be operated.

Coffman & Bristow discovered a 9-foot vein in a porphyry and slate formation near Grants Pass.

The miners at Hawkinsville have not been able to do any mining of consequence since December last for lack of rain.

On the Hedge Creek mine near Mott a 90-foot tunnel has been cut through a ledge 5 feet wide, carrying $9 to $21 in gold.

The clean-up in the Great Northern, near Canyon City, last week amounted to $2367.

The Baker City *Democrat* says the sale of the Belcher group took place last week to Salt Lake and Eastern people. H. G. Snyder has been retained as Supt. The purchasers will push development work with a view of putting a milling plant on the property early in the season.

WASHINGTON.

The Bay State, near Chevelah, sunk a 40-foot shaft and found an 8-foot vein, carrying gold, silver and copper, assaying $35 total value.

Heavier machinery will shortly be required for the Bonanza mine, near Bossburg. J. Hanleyis Supt. Announcement is made of the discovery of another large ore body on the 300-foot level.

The Gold Bug, located two miles north of Pierre's lake, reports the discovery of a 4-foot ledge.

Another strike was made in the new Eureka camp.

An 8-foot ore body of good value was opened on the Lily mine, which is owned by the Big Six Co., mostly Spokane men.

The output of bullion from the Everett smelter during 1897 aggregated 4500 tons, valued at $1,700,000.

The Le Roi smelter at Northport started the No. 1 blast furnace last week. This puts the whole plant in operation for the first time since the smelter blew in. The daily output when running full force is 400 tons per day. The mine is shipping its second and third grade ores. There are 175 men on the pay-roll.

S. H. Manly purchased a half interest in seven properties near Republic for $5360.

BRITISH COLUMBIA.

(Special Correspondence).—The Channe Co. have purchased four more prospects on Nansen island, in the Nanaimo district, and will develop them. Several claims on the west coast of Alberni were sold to English capitalists this week. Very few claims in this copper district still remain with the original holders, English and American capitalists having bonded or purchased them.

The Fern mine has had another clean-up of $12,700 and state that another dividend will shortly be declared. The Fern is a Kootenay free-milling proposition.

The Tinhorn Co., Fairview, claim that, through the errors of a former Supt., they find themselves without funds and a mine not yet in shape for cheap working. The promoters, Dier, Davidson & Russell, are giving the company 100,000 shares of their own stock to sell for the purpose of buying machinery in San Francisco for the quick development of the mine.

The Winchester Co., Fairview, is paying expenses as they proceed. They are sinking a shaft directly on the vein; the ore for 80 feet shows a high average in mill runs.

The Fire Mountain-Harrison Lake Co. have been crushing since Feb. 3. A section mill is the only kind that can be packed to the mine, so steep is the mountain. A road will shortly be built.

Vancouver, March 15th, '98.

The Brooklyn mine, near Nelson, has been bonded by W. McKenzie and others for $75,000, on which they made a cash payment of 10 per cent.

The Jubilee mine, near Ymir, has been bonded for $60,000.

W. J. Robinson has bonded the Baldwin, Harper & Holten claims in the Ymir district for $35,000.

The Boundary Creek M. Co. contemplate putting in a steam pump on their Last Chance claim in Skylark Camp.

A steam plant—hoist, pump and compressor—is contemplated on the Brooklyn, in Greenwood Camp, Yale district.

The Canadian Pacific Expl., Ltd., Rossland, intend to put in power drills and a stamp mill on the Porto Rico, near Ymir.

The Fern mine, Nelson district, will order ten additional stamps for their mill. F. C. Innes of Spokane is Mgr.

It is stated that the McKay mines, Fort Steele district, will place a 20-stamp mill on their property this summer.

The Chieftain, bonded for $50,000 to Beaven & Mackenzie, shipped three tons of ore which returned $938 per ton; the majority of it was antimonial silver.

The Promitura, bonded for $25,000 to Mr. Brody, struck the main ledge. The bonder will buy the property.

From a 6-foot ledge in the Tamarack shaft, near Ymir, a result of $16 per ton was obtained. The ore is free milling, and can be mined and milled for $6.50 per ton.

The Trail Company ratified the sale of the Columbia & Kootenay mine to the British America corporation. The company has received $50,000 on the first payment.

An English company has bonded the Bugaboo group, East Kootenay, for $63,000. A cash deposit was made.

The Le Roi mine will install three additional drills.

THE KLONDIKE.

The Treasury Department at Washington, relative to certain articles destined for the gold fields of Alaska and the Canadian Northwest Territory, has instructed collectors that the articles free of duty which may be carried by passengers arriving at Alaskan ports for such destination include all wearing apparel and other personal effects and necessary outfit, such as tents, blankets and cooking utensils intended for immediate use. These instructions are in explanation of regulations issued on February 2nd last, which were not fully understood by the customs officials in Alaska. This makes clear that those bound for the Klondike or other mining districts of the Canadian Northwest, by way of Alaska, are not required to pay duty to United States customs officials at any port in Alaska on such articles as are specified.

Letters dated February 24 from Telegraph creek, at the head of Stickeen river, report discoveries of gravel and quartz claims of good value. Thirty pounds of gravel taken from the rim of the channel yielded 75 cents to the pan. The people making the discovery have leased 200 miles on the channel of the Stickeen river.

Five men located eight quartz claims on Stickeen river, ten miles from Telegraph creek. After staking out the claims they traveled ninety miles to record their locations. The ledge is said to be 800 to 1000 feet wide, assaying from $5 to $200 per ton, averaging $20. Sample ore sent to an assay office in Seattle yielded $392 gold, $2.30 silver, while another was $4 gold, another $184, and two 40 and 60 cents per ton.

The leasers of the gravel began work at the date of writing to crosscut the channel and push development work.

UTAH.

The Mercur mine is paying $432,000 per annum on a valuation of $1,690,000, or over 18 per cent on a basis of $8.45 a share.

The *Tribune* states that with the cyanide

process at De Lamar mills, comes a fatal disease of cyanide poisoning and antimony.

Reports from the Conger M. Co. at Bingham show an average of 22 per cent lead and $4 gold per ton.

J. D. Frawley has secured a lease on the Yankee Girl at Silver City, and work will be resumed at once. The option calls for the payment of $20,000, the owners to have a royalty on all ores taken out.

The Horn Silver at Frisco employs over 150 men. Six cars of ore, silver and lead, were shipped last week.

The Golden Gate mill at Mercur cost upwards of $300,000. It will be operated by electricity and the ores will be roasted by gas, manufactured on the ground.

Recent developments in the Sacramento show four veins of good milling ore. The fourth vein was disclosed last week.

The South Swansea made a 100-ton shipment last week.

The North Star at Tintic shipped a carload of ore that carried six ounces in gold and some silver.

The Mammoth has secured a ninety-day option the New East Tintic Railway, from February 15th.

The Junction is taking out good shipping ore. The ore is a lead carbonate and the first-class runs sixty ounces silver, 45 per cent lead and $1.20 in gold.

A deed of trust has been given L. D. Thoman for $150,000 by the Asyrian Asphalt Co. on their mining properties near Provo.

Following are ore shipments from the Mackintosh sampler for last week, in pounds: Silver King, 886,960; Anchor, first-class, 65,990; Anchor, concentrates, 194,390; Ontario, 74,730; Daly leasers, 39,280. Total, 1,261,350 pounds.

The Park City *Record* says it looks as though the Alliance people would not go into the proposed consolidation, and, if they do not, the company will resume operations on its own hook. It has several thousand dollars in its treasury, and work can be commenced at a day's notice.

IDAHO.

The Horseshoe Placer Mining Co., Salmon river, proposes to turn the volume of the Salmon river from its channel at the Horseshoe bend through a neck of gravel—the cut-off proposed being about 1320 feet in length. This will expose the present bed of the river about two miles. They have commenced work.

Since his appointment as receiver of the Red Cloud claims, near Hailey, E. Wilson has paid off claims aggregating nearly $100,000. He will make his final report and ask to be discharged.

Work at the Red Cloud has been resumed. A 250-foot crosscut will be driven on the tunnel level, and future operations will depend upon the developments there.

Work is in process to dredge the deep placers near Eagle.

The Atlantic, near Wallace, came upon an ore body of good value across the entire face of the tunnel.

G. Cox, in developing the O. K. mine near Kellogg, struck 4 feet of ore, 18 inches of which is galena.

F. R. Reed has closed a deal for 570 acres of placer ground in the upper Boise. It will be worked at once.

MONTANA.

Another strike was made in the property of the Alice Mining Co. at Walkerville, at a depth of 200 feet, assays from which show 200 ounces silver and $60 per ton gold. Heretofore the ore has varied from 12 ounces in silver and $4 in gold to 100 ounces in silver and $40 in gold in this portion of the company's territory.

The strike in the Queen of the Hills, near Neihart, shows a vein 20 feet wide, 3 feet of which is high grade. The remainder of the vein is low in assay value, but all of it is ore, ranging from ten to fifteen ounces of silver per ton.

The Hope mine at Basin, which has lain idle since the fire of March, 1896, resumed operations last week. About two weeks ago a new company was organized, known as the Basin Gold and Copper M. Co., which purchased the mine for $209,000, and at once began preparations to resume working the mine. Gov. Smith is president and Mr. Hewett vice-president of the new company. Mr. Hewett says that the plans of the new company contemplate working the mine on a much more extensive scale than it has been worked heretofore. The company intends to increase the capacity of the mill from 150 tons daily to 500 tons.

The sale of the Snow Shoe mine at Libby to an English corporation for $200,000 will stimulate the mining industries of the camp. The company will build a concentrator of five times the capacity of the present one, which is of but 200-tons a day capacity. The new mill is to be built near the mouth of the Snow Shoe creek and will be furnished with tramway connections to the mine. The company will run a main working tunnel to a point about 1000 feet farther down the mountain than the present site. The present mill will be used for the treatment of ores from the upper works until complete underground connections are made to all parts of the mine. It is the further intention of the syndicate to make railway connections with the property. The Silver Cable Co. will start its new concentrator at an early date. The Cable concentrator will be run during the coming season and its capacity will be increased as rapidly as practicable with the opening up of the mine. At the beginning it is calculated to handle fifty tons daily.

About one year ago, says the *Review*, a syndicate of New York, San Francisco and Helena capitalists secured permission from Congress to dam the Missouri river at Canyon Ferry, near Helena, Mont., and work was begun at once. On February 19 the dam was flooded, and there is now being installed what is said to be, with the exception of the Niagara Falls plant, the most complete, as well as the largest, electrical plant in the country. Power will be furnished for two of Montana's largest concentrators, the east Helena smelter and the local street-car and lighting plants, and that will take only one-fourth of the power. While the dam was being flooded it necessarily left the river bottom below dry, and several miners got out their gold pans and began active operations in the river bed. In the thirty-six hours that it was dry some panned out as high as $100. Several companies will be formed to dredge the river bottom.

From Jan. 1st, '97, to Jan. 1st, '98, the Alice mine at Walkerville produced 626 bars of Dore bullion, containing in gold, at $20.6665 per fine ounce, $14,709.33, and in silver, at the standard value of $1.2929 per fine ounce, $14,-990.01, making a total value of $629,699 34. During the year the company sold 5297 625-1000 tons of ore, for which they received $269,-777.84, being an average of $50.90 43-100 per ton.

The Granite and Bimetallic properties have consolidated. The stock is to be distributed in the proportion of three-fifths to the holders of Bimetallic and two-fifths to the stockholders of the Granite.

WYOMING.

J. Gibson has secured a bond on the Gladstone mine at Atlantic City, and will begin work at once.

SOUTH DAKOTA.

The Holy Terror mine, near Deadwood, is running steadily and paying monthly dividends of $9000.

The Bismarck and Big Hit properties near Deadwood, under bond by J. Barth of Milwaukee, are working twenty-four men and milling forty tons per day from the Bismarck. The ore averages $5 per ton; there is a large percentage of concentrates running $80 per ton. A carload per week is shipped to the smelter for treatment.

Judge Amidon at Deadwood instructed the jury in the case of the Buxtons against the Golden Reward mine to return a verdict for $220,000 in favor of the plaintiff.

By the total destruction of the D. & D. smelter, which occurred last Thursday, and of which note was made in last week's issue, 400 men are thrown out of employment. The loss to the company is $230,000, fully covered by insurance. The Deadwood *Times* says it is probable that the smelter will be rebuilt.

MICHIGAN.

The annual report of the Atlantic Mining Co. for 1897 compares as follows:

	1897.	*1896.*
Mineral products, lbs	6,766,960	6,448,600
Refined copper, lbs	5,109,663	4,894,238
Total income	$574,783	$531,160
Expenses at mine	401,806	394,378
Smelt, trans	67,162	64,830
Total costs	468,969	459,208
Mining profit	105,814	71,951
Timber sales	657	3,185
Construction	49,394	46,726
Surplus	57,077	28,410
Dividend	40,000	40,000
Net surplus Dec. 31	156,362	179,285
Cost copper (ex. com.)	9 17c	9 38c
Average selling price	11 23c	10 84c

The mineral yielded about 75 51% in refined copper. The directors say: "The yield of rock was not quite as high as in 1896, and the increased quantity stamped accounts for the increased quantity of copper produced."

COLORADO.

The statement of the Gold Coin Mines Co. for the year ended Dec. 31st, '97, compares as follows with the preceding year:

	1897.	*1896.*
Tons smelting ore	1,238	1,450
Tons milling ore	30,559	19,257
Gross value	$287,848	$309,677
Mining cost	196,006	128,568
Balance	91,842	181,109
Miscellaneous expenses	53,354	70,499
Profit for one year	38,488	110,610
Sundry receipts	.....	9,819
Total net	38,488	120,429
New property purchased	10,000	.....
Dividends paid	50,000	85,000
Surplus, def	21,512	35,429
Construction	.....	23,270
Cash on hand	6,565	26,175

Development work during the year was as follows: Sinking shafts, 257 feet; drifts, 3187 feet; crosscuts, 181 feet; winzes, 137 feet; upraises, 658 feet; total, 4420 feet.

Pres. Bush says the value per ton of the ore has been less than formerly, and it has been found impossible to reduce the mining expenses for development work in proportion. The general condition of the property grew less satisfactory after the first quarter until the last quarter of the year, when an improvement was noted, the average value of the ore shipped in December being about $1 per ton higher than in November, and $2 per ton higher than in October. In the early part of December, however, a series of accidents disabled the entire motive power. This necessitated a partial shutdown of the property, although it was impossible to reduce many of the December expenses. Immediately following this a serious cave-in occurred in the 1000-foot level in the Indiana mine, the source of our best production, killing three men and injuring a fourth. This cave-in has been cleared and enough ore is being extracted to supply the Kansas mill, and further operations have been suspended until the resumption of the service by the tramway, which is promised at an early date.

Eighty men are employed at the Resurrection mine, Leadville, the monthly production being 2000 tons of ore. The Resurrection owns 450 acres.

It is estimated that 100 tons per day of high-grade lead ore is being shipped from the Weston Pass district, near Leadville.

The present output of the Ibex mine is 375 tons daily of oxides and sulphide ore.

In one day 245 tons of ore was hoisted from the Gold Coin at Victor which will average $40 per ton.

Shipments are made from the Rigi at Victor, the average of which is from three and a half to four ounces, and the ore lies in good width.

Cobb & Wilson, on the Zeolite, near Victor, are in a large body of low-grade ore and are making frequent shipments while opening up ground.

The Denver *Republican* says that the March output at Cripple Creek is running ahead of February. Surface work is being started again all over the district, and as winter draws to an end there is a better demand for leases, and the outlook for new work is brighter than it has been for months.

About forty tons of mineral per day is being shipped by the Big Six at Leadville. The ore is low grade in quality as a rule. The Stead lease at Leadville, with others on the Nisi Prius, run the shipments close to 120 tons per day. The mineral, although low grade, is a desirable smelting product.

The *Miner* says that the Idaho mine, near Silverton, is soon to be started by a new company, and that upwards of $50,000 will be expended in its development and the erection of a concentrating mill of eighty tons daily capacity.

A strike has been made on the Star of the West, at Silverton, of ore 3½ feet wide, carrying gold, silver, copper and lead, and averaging over $17 per ton.

Sanborn & Co. of the Acacia at Cripple Creek have ore aggregating 10 inches in width, giving average assays of two ounces.

The Lizzie G. at Saw Pit is producing a carload of mineral daily, which runs $40 per ton, principally gold. The ore is in a flat vein from 30 to 35 feet in width by 3 to 4 feet in thickness.

Smith & Hyatt have opened into big bodies of ore in the Waverly group, near Idaho Springs, and will begin shipments next month.

The Metropolitan adit at Idaho Springs has found some neglected ore bodies which, in addition to the gold and silver, run 5 per cent copper and 111 per cent lead.

F. Burns has made a find of a lead at Lamartine that runs $130 in gold and $12 in silver.

In sinking the shaft at the Bantsa mine, up Spring gulch, the best strike of ore ever found in that vein has just been opened. It has the appearance of being smelting ore, of sufficient width to make it a paying proposition within a very short time. The indications are that the upper part of a big ore body is being cut into.

The Joslin M. Co., sinking on the King group, near Idaho Springs, opened into 18 inches of ore that runs $80 gold and $300 in silver to the ton. The streak is 10 inches wide.

Annas & Co., in the Newton mine, have opened into ore running twenty-two ounces gold, 168 ounces silver, 20 per cent lead and 16 per cent copper.

The Victoria group at Gilpin was purchased by Pennsylvania men for $25,000. The erection of machinery and active development will be inaugurated this month. The 15-stamp mill in connection with the property is to be remodeled and concentrating tables are to be put in. A new pump will also be added. The placer ground, covering some forty acres, will also be opened.

At Lawson the Princess of India tunnel, which is driving into the mountain on the south side of Clear creek, is in big bodies of low-grade ore. It is thought that the outer edge of an ore chute is being touched.

P. C. Shull of Leadville has given instructions to begin work on the Murray property as soon as things can be put in shape. The mine had a great record for silver production in the earlier days of silver mining.

Hays & Co. have bought the Dictator mine at Lawson for $7000 and will at once sink a shaft.

On the McKinnie claims at Cripple Creek there are four producing shafts. The output from the Johnstone lease on the Republic has run from 200 to 300 tons a month for half a year.

The Mattie L. made a find of 30 inches of two-ounce ore. Last month the lessees shipped 173 tons, the last six cars of which averaged $75 per ton.

Lessees on the main shaft of the Christmas are getting out from 80 to 100 tons of two-ounce ore a month.

The Perigo at Perigo is employing forty men. Since the present operators took hold in July, '96, the main tunnel has been driven nearly 1000 feet, and at present is in over 4000 feet. The tunnel is 15 feet wide. During February the daily output reached 98⅛ tons, but this month 115 tons of ore is treated every day.

The Columbine mine, near Idaho Springs, was sold to a company and the amount is believed to be $40,000. W. E. Renshaw takes charge and begins active development. Ten claims are included in the deal.

Tin is said to have been discovered near Morrison, which Prof. Caldon says is true cassiterite—the same that is found in the Penzance mine of Cornwall.

Twenty-one lots of ore were received in one day by the Chamberlain mill at Georgetown, and during the past week the same mill paid out $12,000 for ore.

The Stephens lead mine at Georgetown has been storing its ore since Christmas and has begun to ship. Fifty tons of high-grade lead ore were shipped last week. From now on the shipments will be steady.

The Georgetown mining syndicate operating the Mascot lode are making monthly shipments which run from three to five ounces gold, thirty to fifty ounces silver and 6 to 10 per cent copper.

Nelson & Doane, Georgetown, have a streak from 10 to 30 inches wide in which the ore averages $40 to the ton.

The Clear Creek mill at Empire Station is running night and day, handling one ton of ore per hour.

The Iron City and Penn mills at Black Hawk are running full capacity, the Iron City twenty-five and the Penn forty-five stamps.

The Mason lease on Battle mountain is in a good body of ore and regular production is being made.

The old Tambourine mine in Wall Street Camp last week shipped 100 tons of ore which ran $15 per ton. They also shipped seven tons which yielded $56 per ton, and 100 pounds which returned at the rate of $1260 per ton.

The Virginius at Leadville outputs twenty-five tons a day of dry siliceous ore.

Iron shipments at Leadville have increased the present month and all the large iron and manganese producers are working full forces.

The Jolly Tar at Victor made its first shipment since the first of the year, consisting of seven cars of ore averaging $25 to the ton.

A one-fourth interest in the Jefferson was purchased by the Woods Investment Co.

Crozier & Williams, on blocks 8 and 9, at Victor, have opened a body of $25 ore at the depth of 100 feet.

Clark & Reese, on block 5, have a 3-foot vein of granite quartz, rich in synvanite.

The shipments from block 1 at Cripple Creek run $60 per ton.

The Fox lease is producing twelve tons of ore daily of an average value of $50 per ton.

Vaughn & Christian are producing an average of fifty tons a week, the ore running $80 a ton.

The Ouray *Herald* says Gen. Mgr. Hammond of the Treasury tunnel has decided to put in machinery at once for developing power. The tunnel is in 300 feet.

Ore shipped over the Rio Grande from Ouray during March amounted to 170 cars.

NEW MEXICO.

The Cochiti Co. is sinking the main shaft on the Albermarle as fast as possible; men are engaged blasting out the foundations for the reduction plant, and another force is crowding construction work. When these improvements are completed the force will be increased as fast as they can be employed advantageously in development work. Albermarle ledge varies in width from 20 to 30 feet; it towers from 50 to 150 feet above the country formation, and can be traced through the four claims forming the Albermarle group a distance of 6000 feet. So far about 700 feet of development work has been done and the depth attained is 300 feet in the main shaft. The plant for the treatment of this ore by the cyanide process will start with a daily capacity of 125 tons. The force now employed on the Albermarle numbers 300.

The Deadwood mine in Mogollon has a large ore body, which runs $16 in gold and $21 in silver ore.

Eight men are employed upon the Little Fannie, retimbering and repairing the main working shaft. Whether the mine will be operated steadily is not known. There is said to be an abundance of comparatively high grade ore developed in the mine and several responsible parties have hitherto offered big royalties for a lease upon the property.

The Confidence mine, near Grahm, is working seventy miners and supplying eighty tons of ore per day, feeding thirty stamps to full capacity.

At the Copper Queen mine the 15-stamp mill is running steadily, producing silver and gold.

The Colfax tunnel, near Elizabethtown, has reached 800 feet and cut a stringer of rich ore, 12 inches wide.

W. Armstrong, in the Columbine, in Red River district, has struck a vein of gold-bearing quartz 7 feet wide, which is said to average $17 per ton.

In and around Elizabethtown mining operations will be prosecuted with more vigor the coming season than ever before. During the coming two months several new mills will be put in on good properties, lode claims will be extensively developed and the placer grounds worked on a more extensive scale than in the past. A large amount of placer machinery of improved make has been installed the past winter and better results in saving values are expected.

Brigham & Terrett have struck good ore near La Belle and are pushing work on a shaft. The ore runs $8 to the ton.

The *New Mexican* states that the Rio Arriba Placer M. Co. closed a deal for 900 acres of placer ground on the Chama river, near Abiquiu. The Rio Arriba Co. is composed of St. Louis and Kansas City capitalists, and will push development as rapidly as men and money can do the work. J. Schreiner of St. Louis is Pres. of the company.

Cerillos *Register*: Supt. A. M. Watson of the Ortiz mine, near Cerillos, says the milling capacity of that property will be largely increased in the immediate future.

ARIZONA.

(Special Correspondence.) The Copper King of Arizona, near here, has an ore body. The company will soon let a contract for a 100-ton smelter. Another company is sinking a double-compartment shaft on a claim adjoining the Copper King property, called the South Bisbee Copper Mining and Townsite Improvement Company.

Bisbee, March 14th, '98.

The Etta mine, near Prescott, from a twelve days' run produced thirty pounds of gold.

The bonded properties in Cochise county the past few months amount to twenty. Demorest & Reider bonded the Galena Chief and Standard mines to C. S. Bosworth for $15,000. The Arizona mine in the Chiricahuas was bonded to Corbett & Wyman for $20,000.

B. Dunlap has bonded to Wilson & Bosworth one of his mines on the Grand Reef ledge for $25,000. He is developing copper claims about a mile south of the Grand Reef mine and is having them developed.

Republican: The Continental mines, a group of five claims, fifteen miles west of Globe, have been sold to the Federal Mining Co. of New York, the principal stockholder being the Old Dominion Copper Co. A large sum of money has been expended in development work. The Federal Mining Co. comprises moneyed men of Boston and New York already

largely interested in copper mining. Work was resumed last week with sixteen men. N. L. Amster is Supt.

At the Commonwealth mine, at Pearce, 104 men are on the pay-roll and $10,000 is the monthly expenditure for labor.

The Middle March Co.'s smelter in the Dragoons will blow in April 1st. The smelter is fifty-ton capacity. Thirty-two men are on the pay-roll.

H. P. Ewing has a 2-foot ledge in the Acquarius range, Mohave county, which yields three ounces gold and 20 per cent copper.

The Little Klondike, Maricopa county, was sold for $6,000.

Work has resumed on the Continental mines, Gila county. When a few feet had been driven in the lower workings oxide and native copper were encountered.

The Middle March Co., in the Dragoon mountains, Cochise county, will have a fifty-ton smelter in operation April 1st. The property has high grade copper ore. Thirty-two men are now on the pay-roll.

Casey Bros., operating at Dos Cabezas, Cochise county, bonded their group for $50,000.

On the Belle McGilroy mine, Mohave county, a shaft is down 140 feet. The average ore body goes $30 in gold per ton. Blakely Bros. have leased the mine and will put in a concentrator.

The Commonwealth M. Co.,at Pearce, ships an average of one hundred carloads of ore per month. The ore averages $20 gold and eighty ounces silver. Depth attained March 1st was 500 feet.

The Congress mine struck good ore at the 650-foot level and also on the 500-foot level, larger and richer than that they have been working for years; they have practically opened up a new Congress. They are now working to strike the ore body of the cross lead at the 1000-foot level.

The Golden Wonder mine, near Payson, found at 250-foot depth 5 feet of ore, assaying $20 in gold.

MEXICO.

Good ore has been found in the mountains thirty miles east of Casas Grandes of silver and copper and also of lime rock that will assay $75 per ton in gold. The property is near the Quadro Amigoes copper mine, south of San Pedro.

C. D. Lane is sinking a shaft on the Simpson mining property at El Oro.

C. B. Flynn of Monterey states that he sold the Alvino mine, in Durango, to an English company for $435,000 gold. The Alvino is a silver producer. The owners will put in new machinery and work the property extensively.

At La Colorado ore from the Grand Central mine is conveyed to the Amarillas mill.

At La Mina Mexicana, sixty miles from Nogales, thirty-five men are employed, and work is pushed. In February eighty tons of concentrates was shipped.

Two Republics says that among the large properties developed from an abandoned mine is the Santa Rosalia, twenty miles above Arispa. The property was bonded at $12,000, and with the expenditure of $6000 put in shape, and the first month that shipments were made $15,000 was realized, and for a year past the mine has yielded that amount every month, in addition to the accumulation of a dump that will run from $75 to $200 per ton. The ore carries gold only.

Two Republics says word is received of the burning of the Santo Domingo mine at Santa Eulalia, fourteen miles southeast of Chihuahua. The Santo Domingo is owned by the Chihuahua M. Co. At midnight the shift came out for lunch, except two Mexicans. The shaft is 1400 feet deep, timbered from top to bottom. It is supposed that the two men who stayed at the bottom of the shaft built a fire to warm their coffee, and after lunch went to sleep. This was a new shaft. The hoisting works were also destroyed. The Santo Domingo is one of the group known as the Santa Eulalia. The total loss is estimated at $250,000.

AUSTRALIA.

The Beacon mine at Bucca Creek, N. S. W., crushed last year 5980 tons for 8916 ounces, and three dividends of 6d per share each were declared, equalling £15,000.

Victoria's output of gold for the past year is 772,720 ounces. Bendigo heads the list, 200,320 ounces; Ballarat, 178,910 ounces. Returns from various gold fields throughout Queensland give a gross total for January of 49,789 ounces, which is an increase over January, 1897, of 5286 ounces.

Recently Declared Mining Dividends.

Champion, California, 25 cents per share, $8500; March 15.

Mercur, Utah, 18 cents per share, $36,000; payable March 20.

Silver King, Utah, 25 cents per share, $37,500; March 10.

Swansea, Utah, 5 cents per share, $5000: March 10.

Alice, Montana, 5 cents per share, $20,000; payable March 31.

South Swansea, Utah, 5 cents per share, $7500; payable March 21.

Elkton, Colorado, 2 cents per share, $20,000; papable March 21.

Sacramento, Utah, ½ cent per share, $5000; payable March 31.

Recent California Mining Incorporations.

Bella Josephine G. M. Co., San Francisco; capital stock, $100,000; subscribed, $50; A. Bouvier, H. G. Platt, J. A. Bouvier, R. Bayne, H. B. de Marville.

Peoria M. Co., Fresno; capital stock $10,000, subscribed $6,000; T. C. Archer, W. Helm, J. P. Vincent, C. B. Kemble, J. W. Herbert.

Coast Industrial Notes.

—Equally with gold and copper, warships are in greatest present demand.

—The Carson and Tahoe California Lumber and Fluming Company will operate this year with a full force.

—A dividend (No. 27) of 25 cents per share has been declared on the capital stock of the Paraffine Paint Co. of San Francisco, payable March 29.

—The Pacific Coast will get no river and harbor appropriations at this session of Congress, that entire matter going over till next December.

—Fascines will be used on the San Francisco and S. J. V. R. R. in crossing the tule lands near Stockton. Work on the 6000-foot Rodeo tunnel to Port Richmond, Cal., has begun.

—It is stated here on good authority that the Union Pacific is now in control of the Oregon Short Line. The Oregon Short Line carries with it control of the Oregon R. R. & Navigation Co.

—An effort is being made to amend the naval appropriation bill, appropriating $25,000 for making soundings for a cable line from the Hawaiian islands to Japan and also to Australia.

—*Two Republics* says that an electric motor plant is soon to be established near Contreras, Mexico, with a view of running a large factory. This will be the first of its kind in the Federal District.

—The Oceanic Steamship Co.'s steamer Alameda, now on her way from Australia to San Francisco, has on board $3,500,000 in gold. This is the largest amount of treasure ever brought into this port by a single vessel.

—The Union Iron Works of San Francisco offers, if required, to quickly build guns and warships, duplicate in nine months the Monterey, which took three years to build, and, if given a contract, will erect a gun plant and turn out modern ordnance.

—The Oregon and Washington wheat crop of 1897 was 35,000,000 bushels. Of this 21,000,000 bushels have been shipped from Portland and Puget Sound. Detailed shipments for the season commencing July 1st, '97, to March 1st, '98, aggregate: From Portland, 13,178,600 bushels; from Puget Sound, 7,973,762 bushels.

Personal.

S. TYACK, a mine owner of Bodie, Cal., is in San Francisco.

T. E. BERNARD is the new Supt. La Estrella mine, Sonora, Cal.

J. H. FRIZZELL is Supt. Salmon River H. M. Co., Sawyer's Bar.

PRESTON WOODS becomes Supt. Eaglebird mine, Maybert, Cal.

A. M. MCDONALD becomes Supt. Kanaka mine, Groveland, Cal.

GEO. BLAKE, Supt. Bell mine, Tuttletown, Cal., is in San Francisco.

J. MCGREGOR, owner Diadem mine, Forest, Cal., is in San Francisco.

P. R. BRADLEY succeeds D. Johnson as Supt. Spanish mine, Washington, Cal.

J. A. KOCH, a mine owner from Diamond Springs, Cal., is in San Francisco.

F. KLEPETKO is appointed Gen. Mgr. Boston & Montana S. & C. at Great Falls, Mont.

L. L. MYERS, Supt. North Bloomfield mine, North Bloomfield, Cal., is in San Francisco.

C. CLARK succeeds A. Durbin as Supt. Hastings & Poorman mine, Nevada City, Cal.

C. DOBLER, Supt. Brown Bear mine, Deadwood, Cal., has returned home from San Francisco.

C. W. GOODALE becomes Supt. Boston & Montana S. & C. plant at Great Falls, Montana.

S. C. WILMANS, Supt. Boulder mine, Shingle Springs, Cal., has returned home from San Francisco.

D. KEITH, managing owner Silver King mine, Park City, Utah, is in San Francisco en route to Mexico.

W. M. MACKINTOSH of Seattle, Wash., is in San Francisco on his return from Tuttletown, Cal., where he is developing mining properties.

J. GRUSS of San Francisco and his son, W. J., sailed the 10th inst. for Western Australia. Mr. Gruss expects to operate extensively in ore milling at Lawlors, Australia.

Commercial Paragraphs.

IT will be news to our readers, says the Denver, Colo., *Daily Mining Record*, when we announce the change in the corporate name of the Hendrie & Bolthoff Manufacturing Co. Their incorporation papers having expired by limitation, and the State law requiring a change of name when reincorporating, they have complied by changing the name to the Hendrie & Bolthoff Manufacturing and Supply Co. Few concerns in Colorado have such a record. All of the original incorporators are alive, and the stockholders and officers are the same in the new company as in the old.

THE advertisements appearing in various parts of the PRESS over the firm name of Henshaw, Bulkley & Co. will appeal to a large number of readers by reason of the comprehensive line of standard make machinery carried and the well-known standing of manufacturers represented. This firm is successor to the old house of H. P. Gregory & Co., so long and favorably known all over the coast. It is composed of young and energetic men fully conversant with the machinery business and quite alive to the up-to-date requirements of this part of the world in its line.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 8, 1898.

600,214.—RAILROAD SIGNAL LIGHT—J. F. Bean, Martinez, Cal.

600,404.—BICYCLE—S. D. Carpenter, Spokane, Wash.

600,405.—SASH HINGE—C. J. Clarke, Oakland, Cal.

600,478.—HARNESS LOOP—R. G. Cottier, Los Angeles, Cal.

600,215.—PAVEMENT FINISH—W. E. Dennison, S. F.

600,277.—ARC LAMP—I. H. Duncan, S. F.

600,281.—STEP LADDER—Chas. Garland, Grayson, Cal.

600,492.—BOTTLE—E. Gerlach, S. F.

600,198.—ROTARY NOZZLE—H. H. Gortor, S. F.

600,224.—CAR FENDER—W. H. Heywood, Gualala, Cal.

600,225.—SAWMILL CARRIAGE—W. B. Heywood, Berkeley, Cal.

600,424.—CORK PULLER—F. L. Johnson, Valley Springs, Cal.

600,371.—ROAD AND BICYCLE—W. J. May, Tillamook, Or.

600,158.—RATCHET WRENCH—R. J. Miller, Placerville, Cal.

600,231.—SEWING MACHINE—J. H. Mooney, Oakland, Cal.

600,290.—THERAPEUTIC ECECTRODE—J. S. Muir, S. F.

600,270.—AWNING—J. J. Price, San Jose, Cal.

600,379.—CIGAR BUNCHING MACHINE—J. J. Ryan, San Jose, Cal.

600,298.—STEAM BOILER—J. P. Simmons, S. F.

600,298.—GAS GENERATOR—A. J. Tackle, Oakland, Cal.

600,326.—PLUMB LEVEL—C. Warren, Rough and Ready, Cal,

600,464.—HOLDER AND TILTER FOR CANS, ETC.—Webster & Holgee, Los Angeles, Cal.

600,394.—FRUIT CLEANER—B. B. & J. H. Wright, Riverside, Cal.

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Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CIGAR BUNCHING MACHINE.—John J. Ryan, San Jose, Cal. No. 600,379. Dated March 8, 1898. This invention relates to improvements in machines which are employed for the bunching of tobacco and forming it in shape to eventually complete the cigar. The object is to rapidly roll scraps, short or long fillers, into the binder and deliver the scraps or leaves which constitute the filler perfectly straight and parallel with each other, preventing the same from twisting or forming knots or lumps and so that the cigar made therefrom will burn perfectly even for the entire length, the bunch being maintained in a perfectly porous condition from end to end so that the draft is easy and unobstructed. In the construction of bunching machines of this class but little attention has been paid to accuracy of adjustment, and experience has shown that with the utmost accuracy the operation of bunching the tobacco will produce more or less faulty cigars. In my invention I employ a convex table, a carriage having arms pivoted upon the same common center of curvature with the table and adapted to move backward and forward over the table. A roller is journaled on this carriage and a flexible apron is fixed at the ends of the table having an intermediate loose furrow adapted to receive the tobacco to be bunched and be acted upon by the roller when the carriage is moved over the table so that the bunch will be rolled and formed within the fold of the flexible apron. With this are means for holding the ends of the apron end adjusting it so that it always remains exactly in line with the line of travel of the carriage, and means for adjusting the apron and clamping or locking it at any point of adjustment. The bearing shaft, about which the arms of the carriage are turnable, has fitted to it a closed tubular sleeve extending from one arm to the other and forming a continuous closed journal-box, which prevents grit and dirt from obtaining access to and wearing it.

THERAPEUTIC ELECTRODE.—John S. Muir, San Francisco, Cal. No. 600,290. Dated March 8, 1898. This invention relates to a novel method of constructing therapeutic electrodes for the especial purpose of introducing medicinal and chemical substances into the tissues of the human body through the agency of electricity for therapeutical effects. It consists essentially of an electrode consisting of a hollow porous cell adapted to fit the tissues upon which it is to act, said cell being adapted to contain an electrolytic fluid and having an opening through which it may be charged. A conducting rod extends axially into the cell through the closed opposite end and projects through an insulated enclosing envelope having the projecting end split, and in combination with this is an insulated handle having an interior conducting cylindrical surface which is adapted to fit and grasp the split end of the rod so as to make an electrical connection between the two. An electrical conductor extends from this interior surface of the handle to the battery or generator. The exterior surface of the porous cell may also be coated with a non-conducting substance at certain portions, leaving only a part of the cell exposed, and it may thus be adapted to act upon any limited portion of the surface with which it contacts so that the action will only take place through the uncoated surface.

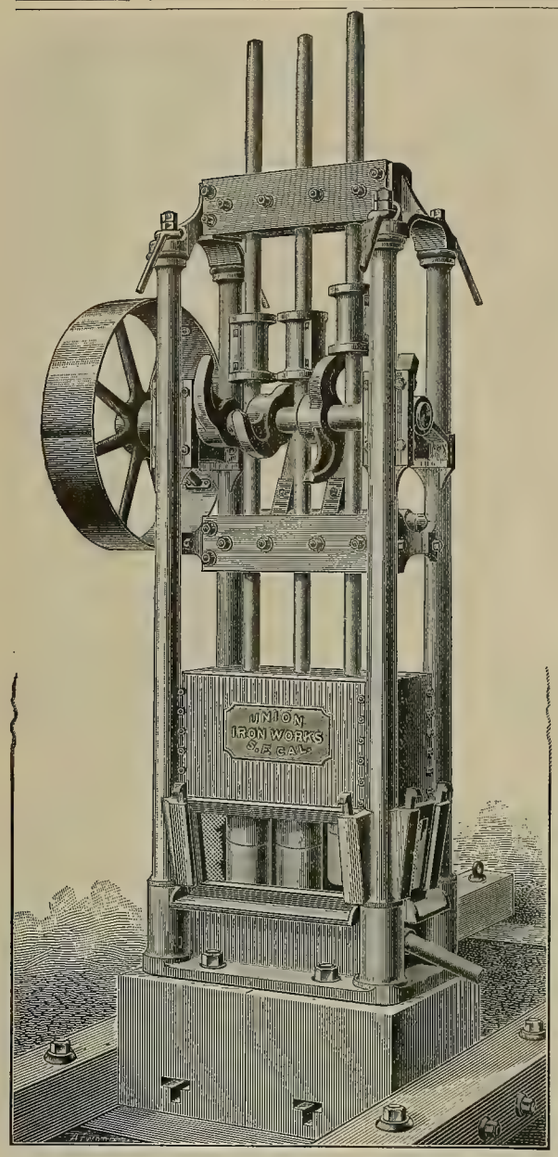
FOLDING STEP-LADDER.—Charles Garland, Grayson, Cal.; one-half interest assigned to J. M. Hammonds of same place. No. 600,281. Dated March 8, 1893. This invention relates to a novel construction of step-ladder which enables it to be easily extended or folded into small compass for storage when not in use. It consists of centrally pivoted side bars crossing each other, having the ends also pivoted together in the form of what is known as "lazy-tongs." Between two pairs of these foldable sides extend the steps, which are fixed between each alternate pair of the side bars between the center and the end. Removably connected brace bars serve to hold the apparatus in its extended position, and when these bars have been detached the apparatus can be folded into very small compass. When it is extended its higher end is supported so that the steps are approximately level by means of transversely crossed standards which are adapted to hook or fit upon the upper end rod, which extends between the side bars. The construction is such that by closing the transverse pivoted supporting bars toward each other, the slotted upper ends will be brought into line with a partially flattened portion of the rod which they clasp and they can then be withdrawn over this flattened portion. When they are applied they are slipped on over this flattened portion while closed together and are then separated, the upper ends being moved outward to a point just within the side bars, and the lower ends being spread sufficiently to form a firm support upon the floor or ground.

AWNING ATTACHMENT.—J. J. Price, San Jose, Cal. No. 600,270. Dated March 8, 1898. This invention relates to improvements in adjustable awnings, such as are used to cover store and window fronts and other places and which are adapted to be unrolled or rolled up in a box above the door or window when not in use. It consists essentially of independent adjacent awnings, having a sufficient space between them to be raised or lowered independently, and in combination with these of an intermediate strip or banner having an independent roller upon which it coils, with a combination device actuating the roller and an extension fixed to the end of one of the awning bars projecting over the adjacent one and serving as an attachment for the lower end of the banner.

GAS GENERATOR.—A. J. Tackle, Oakland, Cal. No. 600,298. Dated March 8, 1898. This invention relates to an apparatus designed to produce an explosive vapor or gas from petroleum oil or volatile hydrocarbon for use in gas engines. It consists essentially of an exterior casing having a discharge pipe from the upper portion adapted to connect with the engine, a centrally disposed vertical pipe extending upwardly through the center of the bottom of the casing, through which pipe the hot exhaust products from the engine are discharged, annular cups surrounding the pipes in succession from near the bottom to near the top, an enclosing open-bottomed casing intermediate between the cups and the outer casing, a supply pipe through which oil is delivered into the uppermost of the cups and allowed to overflow therefrom successively into those below, so that it is brought into contact with the outer surface of the exhaust pipe and vaporized. In conjunction with this an air pipe extends backwardly from the bottom within the exhaust pipe so that air is introduced and heated within this pipe, and arms or branches extend through the sides of the exhaust pipe and discharge into the enclosed chamber above the oil-containing cups so that the air is mixed with the oil vapor and is first carried downwardly through the inner chamber around the cups and the mixed vapor, thence passes upwardly to the discharge pipe, which delivers it in condition for use within the engine.

AT the latest meeting of the American Chemical Society a half gallon of liquid air was ladled out of a covered receptacle packed in several thicknesses of felt, much as if it had been ordinary ice water, but on pouring it into any glass, porcelain or iron vessel it boiled with great violence until the container cooled to the temperature of the intensely cold liquid, which means about —310°F. Drops falling on the lecture table immediately took the spheroidal form and ran about exactly as drops of water on a hot stove. Placed in a glass beaker the liquid first boiled, then became clouded with a crystalline precipitate of carbon dioxide, which was present as an impurity, and from which it was separated by filtration through an ordinary paper filter, and the clear liquid was caught in a double-walled glass cylinder. The space between the walls, having been exhausted to produce a vacuum, the clear, slightly blue liquid air remained in the tube over an hour before complete evaporation. Among other experiments, alcohol was quickly frozen, rubber tubing was hardened by the low temperature so as to break when struck by a hammer almost like glass, and a piece of thin sheet iron, after immersion in the cold liquid, became very brittle.

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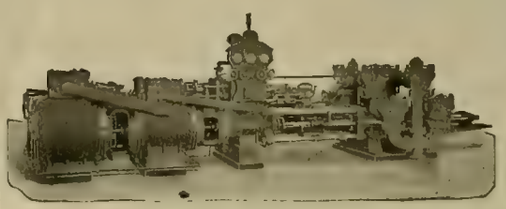
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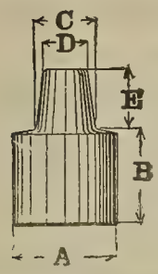
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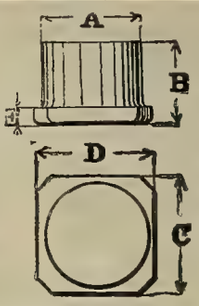
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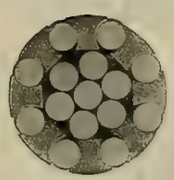
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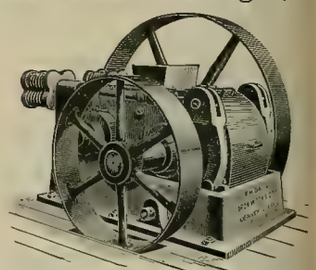
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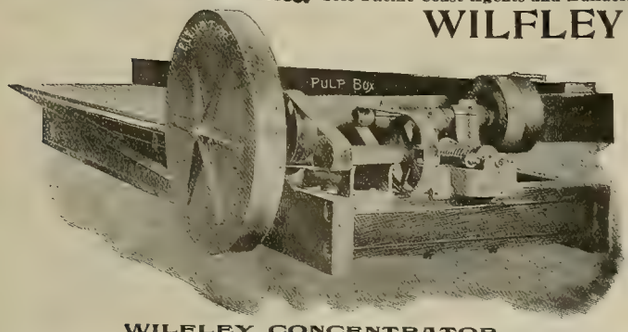
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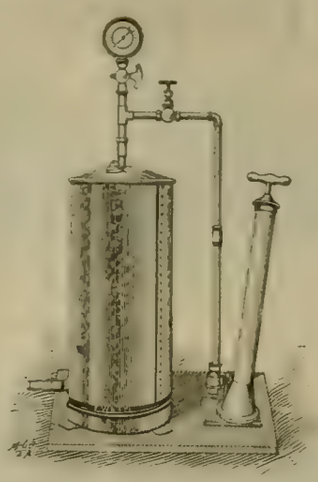
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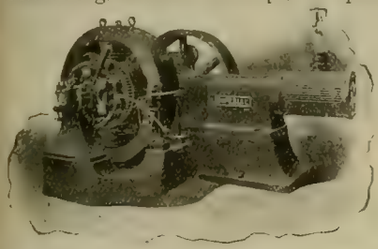
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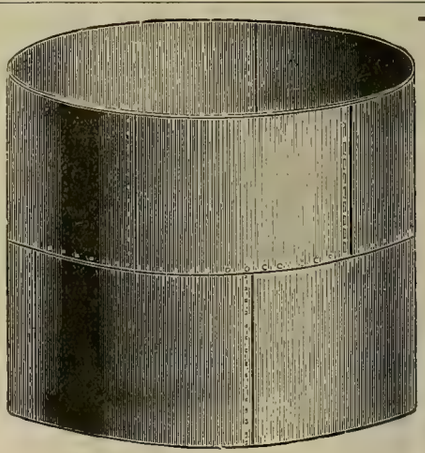
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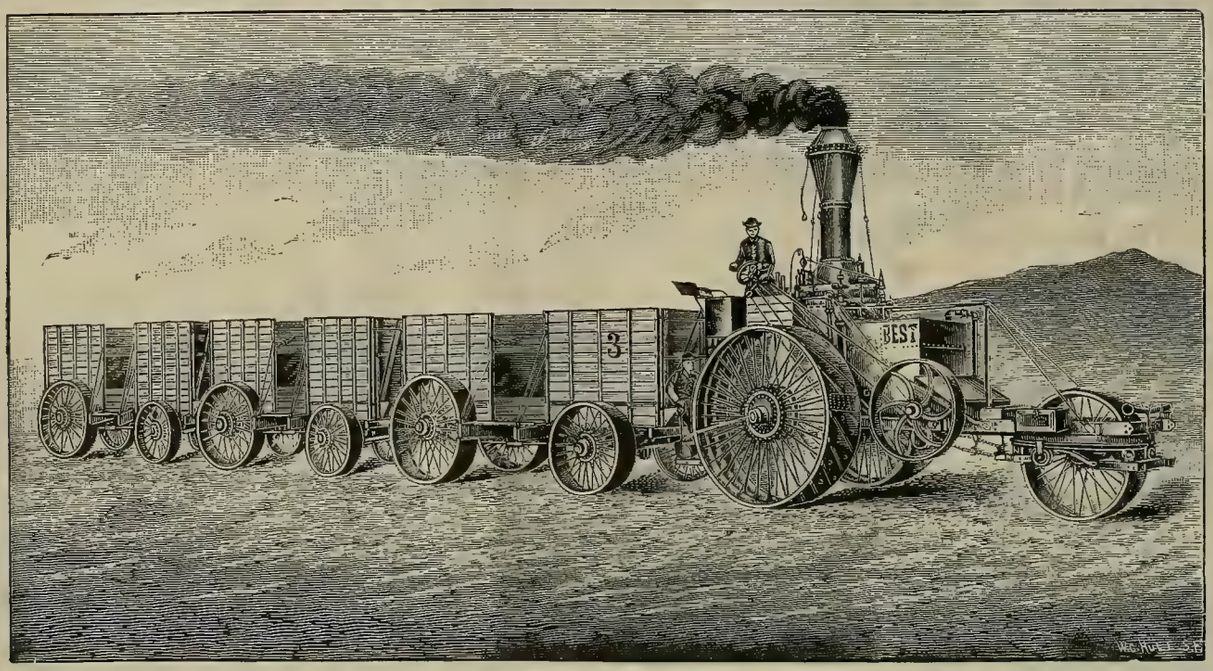
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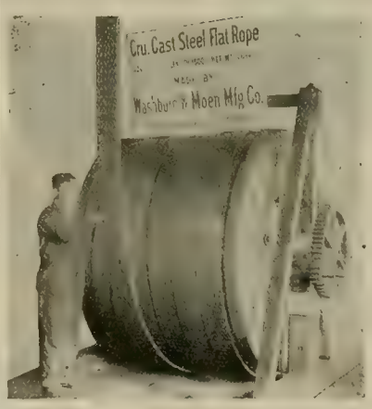
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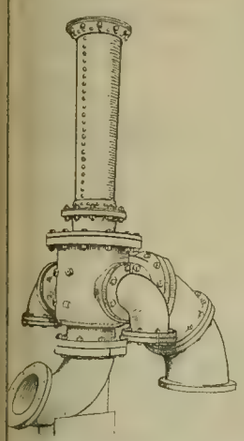
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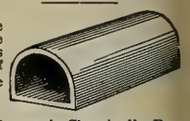
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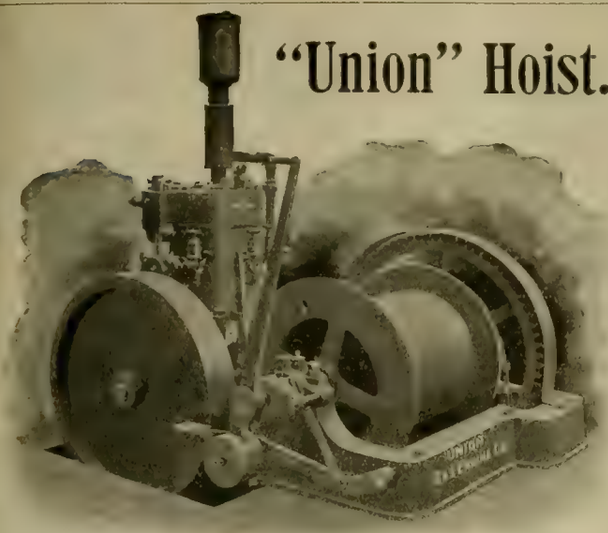
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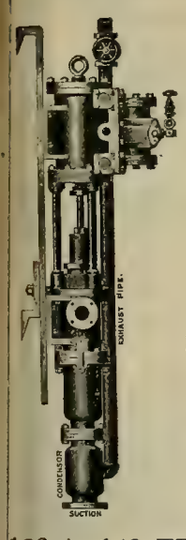
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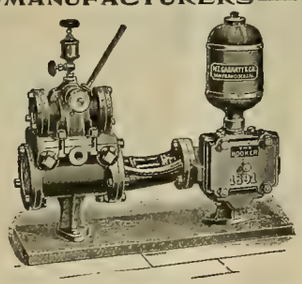
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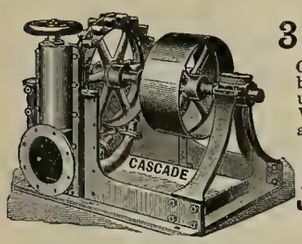
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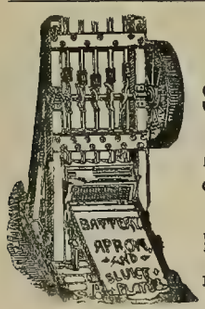




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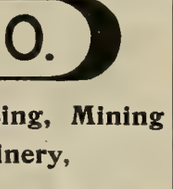
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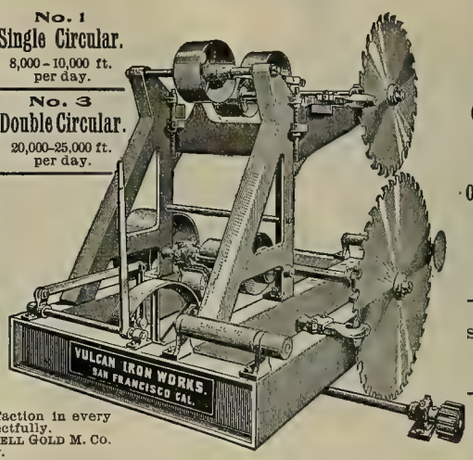
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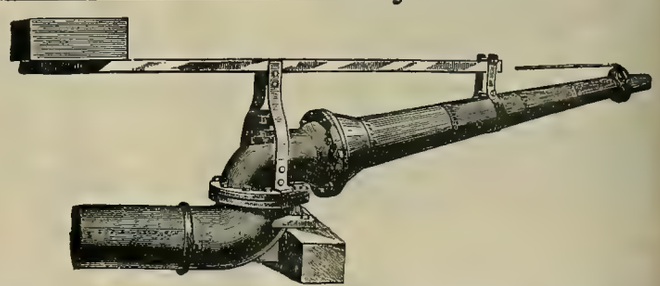
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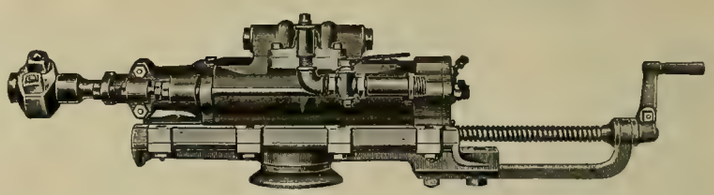
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The Markets.

SAN FRANCISCO, March 17, 1898.

General trade is dull, but not more so than usually obtains at this season of the year. The diverting of the travel from Europe and the East to Alaska and the Northwest Territory to points up North by exceptionally low railway fares has cut off a large proportion of business which it was confidently expected would center here; yet the trade looks for quite a big business from dealers in those sections when navigation on the Yukon is open. There is a good business doing for Alaska salmon canneries, much of which is raw material and new machinery. The uncertainty regarding crops in this State and a scarcity of feed in many localities for livestock, have an unfavorable influence, as do reports of light deposits of snow on the mountain ranges for mining purposes in many districts later on in the season. So far as the writer's advices go, there is considerable activity in the gold mining districts in this State, with the outlook promising fully as much, if not slightly more, of an outturn of gold bullion as there was in 1897. A feature of the past week's exports was a large shipment (115 tons) of spelter to Calcutta for the Indian Government. This order was filled owing to the superior quality of the metal. Ship and steamboat building continues on a liberal scale in California and also up north. The majority of the vessels turned out for commission in the Alaska trade.

The local money market works on unchanged lines. Notwithstanding the fairly free export by water of Pacific coast products to foreign ports and large disbursements at shipping points by persons bound to Alaska and the Northwest Territory, the rates for exchange on New York are at a stiff premium. This can be accounted for partly by free imports of gold sovereigns from Australasia, which goes into the mint here, against which exchange is drawn on the East, and also to the many importers making their regular spring settlements at the East and abroad. The call for money with us for speculative and other purposes is said to be light. The supply of idle money in the banks is said to be largely in excess of that held at the corresponding time in 1897. The imports of gold at the East contiuue large, and this, too, in the face of a higher premium on gold at the financial centers in Europe. From February 25th last to date the imports aggregate nearly $20,000,000, and more reported coming.

New York Silver Prices.

NEW YORK, March 17.—Following are the closing prices for the week:

	—Silver in— London.	N. Y
Friday	25 3-16	54
Saturday	25 3-16	54¼
Monday	25 3-16	54¼
Tuesday	25¼	55¼
Wednesday	25½	55¼
Thursday	27 7-16	54⅝

	Copper.	Lead.	Iron.	Tin.
Fri.	11 87½@12 00	3 80	9 75@12 00	14 35
Sat.	11 87½@12 00	3 77½	9 75@12 00	14 30
Mon.	11 87½@12 00	3 72½	9 75@12 00	14 27½
Tue.	11 87½@12 00	3 72½	9 75@12 00	14 25
Wed	11 87½@12 00	3 73½	9 75@12 00	14 25
Thur.	11 87½@12 00	3 73½	9 75@12 00	14 25

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.82
London Merchants	$4.81
London Sight Bankers	$4.85
Refined Silver, per oz., 1000 fine	54⅞
Mexican Dollars nominal	46@—

SILVER—The New York market fluctuated up to 55¼ cents an ounce fine on Wednesday, against 54 cents on last Friday. At the close the market was easier. The London market did not advance proportionately, which shows that dealers abroad had no faith in it. It is quite hard at this distance from the field of operation to account for the advance outside of the theory that stocks are well in hand and any increase in the demand is met by an improvement in prices. The Indian crops of wheat, flax, etc., ought to begin to move in this month, and by the last of April assume large proportions, which will call for silver. This will be further enlarged when the bumper rice crop begins to go forward in large quantities. These exports are likely lo have an influence on silver. The steamer Doric, hence for Hong Kong, March 12th, took out $108,100 in silver bullion for Bombay.

MEXICAN DOLLARS—The market is very dull. Quotations are largely nominal. The steamer Doric took out only $11,240 for Hong Kong.

COPPER.—The market holds very strong. The consumption is not only very large in this country and abroad, but it promises to increase under an enlarged demand for war vessels building. England's budget calls for an expenditure of $120,000,000 in vessels and Russia will expend $70,000,000. The United States and several other countries will build additional vessels. The building will call for an enormous quantity of copper. Our New York advices state that reports of a sale of 4,000,000 pounds by the Calumet & Hecla are semi-officially confirmed. This and other sales of Lake Superior, together with other varieties of the metal, up to the 11th of this month involves at least 20,000,000 pounds for earliest possible deliveries after the opening of navigation. A Boston exchange special from New York says: "The position of copper remains decidedly strong, with market conditions fully up to the highest levels since the present upward movement began. Twelve cents is now an inside price for Lake, and some special Western and Eastern deliveries are reported at a little over this figure. Sellers continue indifferent, with some declining to offer anything for delivery during March or April. It is said that the demand may run ahead of production. Certainly present production is absorbed so quickly that copper producers have no occasion to worry about a ready outlet for all their product."

Our market is quoted as follows:

Ingot casting, jobbing	13¼@—
Ingot " wholesale	13 @—
Sheet copper	16¾@—
Bolt	¼ and 5-16, 20c; ⅜ and larger, 16¼

TIN.—Imports the past week aggregate 865 ingots from Australia. The market is slightly easier for ingot. In plate the market is largely go-as-you-please, with cutting the order.

The market is quoted in jobbing lots as follows:

Pig	4 75	@	5 00
Sheet	....	@	6 50
Pipe	5 30	@	5 80

LEAD.—The market is easier, with reports current that smelters in the Central West are willing to cut under quotations to place liberal quantities. The consumption in this country is only normal.

Pig, per lb., jobbing		—@	15
Plate, I C coke, heavy, per box	$4 10	@	4 25
" " " light, "	4 00	@	—

SHOT.—Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35		
Drop, B and larger sizes, "	1 60		
Buck, Balls and Chilled, do. "	1 60		

QUICKSILVER.—Exports the past week aggregate 505 flasks to the west coast of Mexico. The market is steady at current quotations.

Our market is quoted at $40 for domestic consumption and $36@37 for export to the west coast of Mexico.

IRON.—The large orders that are being placed for war vessels and merchantmen in the old country and also in the United States will call for increased quantities of iron. The markets at the East and on this coast are practically unchanged.

COAL.—The market is unchanged. The demand is slow for all kinds. Stocks of some grades are accumulating.

POWDER.—The market is quiet but firm. The Santa Cruz factory is still running on government orders.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17½c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

PLATINUM.—The market is steady. Our market is quoted in a jobbing way at $16 per ounce and for scrap $11 per ounce.

ZINC.—The market is steady. Our market is quoted at 10@15c, according to thickness.

ALUMINUM.—The market is steady. We quote in jobbing lots at 45@50c per pound for ingots.

BORAX.—The market is strong at the recent advance.

The market is quoted as follows:

Refined, in carload lots, in barrels	7¼
Refined, in carload lots in sacks	7
Powdered, in car lots, in barrels	7¼
Concentrated, " in sacks	6¾

Chemicals.

There is absolutely nothing new to report in our market. The demand is only fair. Our New York advices report: "A quiet condition of affairs is still being experienced in the market for all lines of chemicals and acids. Liberal deliveries on former contracts are taking place, and, in connection with current new business, involved a large amount of goods."

CYANIDE OF POTASSIUM.—The market is steady. Our market is quoted for chemical pure, 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The market is firm. We quote in a jobbing way at 1½c per lb for 66°.

NITRIC ACID.—Our market is reported steady from store at 6¼@7c per pound in carboys.

BONEASH.—There is a good demand for export. Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is steady. We quote in a jobbing way at 4c per pound.

SPELTER.—A shipment of 115 tons was made this week to Calcutta. The price at which it was sold is kept secret.

We quote our market in a jobbing way at 5c per pound.

BISMUTH.—The market is firm.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (Le Blanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70@75c per pound.

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Andes S M Co, Nev	45	5c	Mar 7	Apr 11	Apr 28 John W Twiggs, Nevada Block
Baliol G M Co, Cal	2	30c	Jan 26	Mar 25	Apr 18 R L Cheney, Mills Building
Best & Belcher M Co, Nev	64	20c	Mar 8	Apr 12	May 3 M Jaffe, 309 Montgomery
Con Cal & Va M Co, Nev	11	25c	Mar 8	Apr 13	May 3 A W Havens, 309 Montgomery
Con Imp M Co, Nev	40	1c	Mar 1	Apr 5	Apr 26 C L McCoy, Mills Building
Crown Point G & S M Co, Nev	73	10c	Feb 21	Mar 28	Apr 18 Jas Newlands, Mills Bldg
Fall River Con G Q Co, Cal	11	5c	Jan 15	Feb 25	Apr 21 A Lorsbach, 313-315 Front
Gould & Curry S M Co, Nev	83	15c	Mar 16	Apr 19	May 10 A K Durbrow, 309 Montgomery
Kate Hayes M Co, Cal	6	$1	Feb 25	Apr 5	Apr 26 H Pichoir, 320 Sansome
Marguerite G M & M Co, Cal	9	10c	Feb 19	Apr 6	May 2 F Mettmann, 225 Sansome
Marina Marsicano G M Co, Cal	13	9c	Mar 5	Apr 11	May 2 Charles Bovone, 217 Sacramento
N Bloomfield Gravel M Co, Cal	50	25c	Feb 25	Apr 6	Apr 27 H Pichoir, 320 Sansome
Occidental Con M Co, Nev	30	10c	Mar 9	Apr 12	May 4 A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	72	25c	Feb 24	Mar 29	Apr 18 E B Holmes, 309 Montgomery
Orleans M Co, Cal	7	10c	Feb 1	Mar 8	Mar 28 Geo O Thurston, 575 Mission
Overman S M Co, Nev	79	5c	Jan 26	Mar 2	Mar 23 G D Edwards, 414 California
Potosi M Co, Nev	49	20c	Feb 5	Mar 11	Apr 4 C E Elliot, 309 Montgomery
Richmond G M Co, Cal	2	1c	Mar 2	Apr 9	May 2 L R Tuttle, 328 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19	Feb 26	Apr 4 A F Frey, Phelan Building

Mining Share Market.

SAN FRANCISCO, March 17, 1898.

Business on the two exchanges continued dull the past week, although crossorders were largely in evidence in some of the shares so as to promote a higher range of values. This advance was looked for by the street, on reports there would be a small advance, to be followed by another decline. As there are so few outsiders trading, it would seem as if the manipulator for the moneyed pool gives out the correct moves, so as to let them make, by which other and "larger game" can be induced to come into the speculative arena. Occidental made a steady move up, leading in the advance, which was taken up by Chollar, with Potosi a strong second, and these in turn was closely followed by Sierra Nevada, which caused the entire line to firm up. The advance in Occidental seems to be based on merit. There can be no doubt that large quantities of ore are being developed, and of sufficient value to admit of extracting and milling so as to pay dividends. The belief with the better informed prevails that both Standard and Occidental will pay dividends and for many months to come after they commence. The advance in Chollar is on reports that a 4-foot vein of good ore has been struck on the upper levels. Potosi is running for the same. Aside from this, they are getting in position, provided the share market justifies it, to commence very interesting and important work on or about the 1100-foot or 1200-foot level. Then the work in Potosi on the Brunswick lode grows in interest. The advance in Sierra Nevada is said to be on news from the mines and the work getting in position when it can be done to much better advantage. This mine ought to be on a paying basis. Notwithstanding the market has moved up slightly, yet prices for some of the shares are below what they should sell at on merit and at which they will sell before four months pass unless the moneyed pool has work in the mines changed so as not to make an ore development. Any advance in these particular shares will cause the entire line to appreciate. There never has been a time when the Comstock mines were worked out, and it will be many years yet before the possibilities of the mines will be exhausted, for there are large areas of ore that can be extracted and milled at a profit, and there is virgin ground above and below the center level in which one or more large bodies of ore may be struck and developed. The history of Comstock mining shows that unlooked-for surprises are liable to occur at almost any time.

At a meeting of the directors of the Gould & Curry Mining Co., a resolution was passed to commence work on the Comstock tunnel level in the north drift run in the Savage ground years ago; to extend it into Gould & Curry, so as to exploit that mine on that level. It is well known that $40 ore was found in the drift, and if this should develop into a good sized body in Gould & Curry it would be quite a factor in renewing more active work at that depth by other companies on that lode. The officials of the company are in negotiation with Mr. Leonard, President of the Comstock Tunnel, for necessary facilities to work the mine on that level, and as it is to the tunnel company's interest to have it done, there can be no doubt of favorable action.

Official letters filed the past week, combined with the movement of the shares, centers attention largely on the work in Chollar and Sierra Nevada on the Comstock and Occidental on the Brunswick; yet the work in two or three others is quite important. In Utah they are still drifting in a northwest direction. No change is reported in the material encountered. In Sierra Nevada they are driving west in the Riley tunnel and at the same time upraising from that level. The general condition of the mine is said to be looking well. On the 900-foot level they are still drifting north. They are making fair progress in No. 2 west crossdrift in Union from the top of upraise from the 900-foot level. In Ophir fair progress is reported in west crossdrift No. 3 on the 1000-foot level and in the west crossdrift on Central Tunnel level. The face of both crossdrifts is in mineralized quartz giving low assays. In justice to shareholders the drill should be used to find out what is ahead. There is no change in the work in Mexican or in the material encountered. In Andes they are working to get a strong circulation of good air, so as to exploit to better advantage. No change is reported in the joint work to the east by Gould & Curry and Best & Belcher on the 800-foot Bonner shaft level.

No work outside of jawbone is being done by the Hale & Norcross people. Good progress is being made in repairing the main west crossdrift in Savage on the 130-foot level. The official letter from Chollar says that on the 100 level, 60 feet south of the north upraise, the crosscut to the west is out 81 feet, advanced 11 feet during the week; face in old ground assaying from $6 to $8 per ton. East of the old fillings is a width of 4 feet of ore assaying $55 per ton. They have put in a square set and started north and south on this ore. So far as we can learn, mining men do not think much of the strike, yet there is no telling what it may lead to. Fair progress is being made in retimbering the main incline. Joint work by Potosi and Bullion is confined to running a south drift from the tunnel level and cleaning out and repairing the old Crœsus shaft. As a time-killer the Alpha management can discount any other management. The official letter says they are repairing the west crossdrift, which was started a short time ago. The joint work by Con. Imperial, Confidence and Challenge is practically unchanged. The strong flow of water indicates that they are near a ledge. No news is allowed to leak out regarding work or contemplated work in Yellow Jacket. Crown Point and Belcher west crossdrift from the 850 foot upraise is being pushed slowly ahead. Fair progress is being made in the east crossdrift on the 1200-foot level in Belcher. If the work is not stopped they ought to strike gold-bearing ore assaying over $40 a ton some time within the next ninety days. They extracted and raised last week forty-two tons of ore assaying $21.31 a ton, but from what level the letter does not report. They are extracting a few tons of ore in Seg. Belcher. The most of the work in Overman is dead work, preparatory to more active exploiting. They are driving ahead in the north drift on the 900-foot level. They are making fair progress in the incline upraise from the 1100-foot level in Caledonia. The top is in low grade quartz. In Justice they are sinking a winze in the ore reported recently.

From the Brunswick the most important item is that in Potosi they are sinking on the 35-foot body of low grade ore found to the west, as reported in last week's issue. In sinking they may get higher grade ore. It is the intention to run a drift from a lower level so as to connect with the winze, which will give a good circulation and admit of work lower down. The joint shaft No. 1 will soon be down a sufficient depth to admit of starting a south drift on a lower level. The Chollar letter reports that the shaft was down 1124 feet on March 11th. Active work is reported in Occidental on the 550-foot to the west; to the east and also to the west on the 650-foot level. The east crossdrift is reported in the ledge. The west crossdrift is in fair grade ore. Fair progress is being made in north lateral drift on the 750-foot level. The joint work by Con. Virginia, Gould & Curry and Best & Belcher is confined to sinking the shaft, running a south drift on the 600 level and a west crossdrift on the same level. In

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STOCKTON, CAL.

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vage they are making fair progress in the in south drift on the 600-foot level.
The following illustrates the changes of e week:

MINES.	Mar. 10.	Mar. 17.
pha	$ 09	
ta Consolidated		$ 16
ides		12
lcher	26	26
st & Belcher	31	33
die		
illion		
allenge		30
ollar		47
nfidence		73
nsolidated California and Virginia	78	79
nsolidated New York		
own Point	14	15
kchequer		06
uld & Curry	18	22
ale & Norcross		
stice		
exican		32
phir	43	44
erman	11	11
otosi	36	44
vage		
erra Nevada	1 05	1 30
nion	34	40
tah	12	10
llow Jacket	26	29

an Francisco Stock Board Sales.

SAN FRANCISCO, March 17, 1898
9:30 A. M. SESSION.

0 Andes	12	300 Justice	34
0 Best & Belcher	33	100 Mexican	32
0 Challenge	30	300 Occidental	2 25
0 Confidence	73	100 Potosi	44
0 Crown Point	15	400 Sierra Nevada	1 30
0 Gould & Curry	22	500 Union	40
0 Julia	03	500 Yellow Jacket	29

SECOND SESSION—2:30 P. M.

0 Ophir	44	600 Sierra Nevada	1 15
0 Gould & Curry	19	100 Utah	10
0 Best & Belcher	32	200 Exchequer	06
0 Con Cal & Va	79	500 Seg Belcher	05
0 Chollar	47	100 Overman	11
0 Potosi	41	500 Alta	16
0 Crown Point	14	250 Occidental	2 35
0 Yellow Jacket	27	100 Andes	10
0 Belcher	26	100 Standard	1 60

Rainfall and Temperature.

The following data for the week ending 5 M., March 16, 1898, are from official urces, and are furnished by the U. S. eather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Minimum Temperature for the Week	Maximum Temperature for the Week
Eureka	1.22	28.05	41.62	34.96	32	52
Red Bluff	0.01	12 08	22.65	20.44	32	76
Sacramento	.00	8 55	15.49	16.04	32	74
San Francisco	0.04	7 49	20.68	18.92	41	74
Fresno	0.24	3.70	9.25	7.78	34	76
San Luis Obispo	0.22	5.37	19.84	....	36	74
Los Angeles	0.50	4 80	16.08	13 95	40	72
San Diego	0.48	3.66	10.91	8.77	38	66
Yuma	0.38	1.65	5.31	2 81	36	80

Assessment Notices.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of February, 1898, an assessment (No. 9) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 1 to 4 P. M. at his business office, 225 Sansome street.

NORTH BLOOMFIELD GRAVEL MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, North Bloomfield, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 25th day of February, 1898, an assessment (No. 50) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on WEDNESDAY, the 27th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey county, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the eighth (8th) day of March, 1898, an assessment (No. 64) of twenty cents (20c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twelfth (12th) day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the third (3d) day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada Block, No. 309 Montgomery street, San Francisco, California.

RICHMOND GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Butte County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of March, 1898, an assessment (No. 2) of 1 cent per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 406, No. 328 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of April, 1898 will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

L. R. TUTTLE, Secretary.

Office—Room 406, No. 328 Montgomery street, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of March, 1898, an assessment (No. 46) of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 24, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 28th day of April, 1898, at 11 A. M., to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Room 22, Nevada block, San Francisco, California.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of March, 1898, an assessment (No. 11) of 25 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 59, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 59, Nevada block, San Francisco, California.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of March, 1898, an assessment (No. 13) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary

Office—217 Sacramento street, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of March, 1897, an assessment (No. 83) of 15 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 68, Nevada block, No. 309 Monigomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of April, 1898, shall be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 10th day of May, 1898, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 68, Nevada block, No. 309 Montgomery street, San Francisco, California.

BALIOL GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of January, 1898, an assessment (No. 2) of 30 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of March, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Mills building, room 7, fifth floor, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors of the Baliol Gold Mining Co., the day of delinquence in the above assessment notice has been postponed to March 25th, 1898, and the day of sale to MONDAY, April 18th, 1898. R. L. CHENEY, Secretary.

Office—Room No. 7, fifth floor, Mills building, San Francisco, California.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of February, 1898, an assessment (No. 6) of one dollar ($1) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 26th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

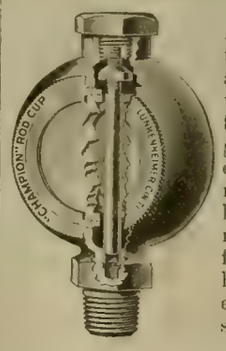
By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

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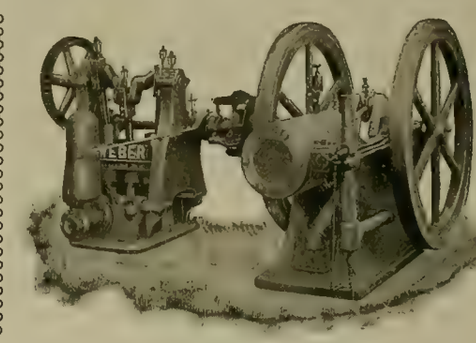


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THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of delinquence in the above assessment notice has been postponed to March 12th, 1898, and the day of sale to MONDAY, April 4th, 1898.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

DELINQUENT SALE NOTICE.

FALL RIVER CONSOLIDATED GOLD QUARTZ Mining Company.—Location of principal place of business, San Francisco, California; location of works, Plumas County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 15th day of January, 1 98, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
L. Cassel	42	500	25 00
L. Cassel	46	750	37 50
L. Cassel	48	2	10
N. W Brunning	49	1,000	50 00
J. Pilger	61	1,250	62 50
H Meyer	26	1,111	55 55
H. Meyer	27	1,111	55 55
H. Meyer	28	1,111	55 55

And in accordance with law, and an order from the Board of Directors, made on the 15th day of January, 1898 so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, 313 and 315 Front street, San Francisco, California, on THURSDAY, the 21st day of April, 1898, at the hour of 3 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

ADOLPH LORSBACH, Secretary.

Office—313 and 315 Front street, San Francisco, California.

NOTICE OF ANNUAL MEETING.

MAMMOTH GARFIELD GOLD MINING COMpany.—Principal place of business, 120 Sutter St., San Francisco, California; works, in Old Diggings Mining District, Shasta County, California.

In accordance with the by-laws of said company, the annual meeting of the stockholders of the Mammoth Garfield Gold Mining Company will be held at the office of the company, rooms 50 and 54, 120 Sutter St., San Francisco, California, at 2 P. M., on Tuesday, the 5th day of April, 1898.

SAM. W. CHEYNEY, Secretary.

Dated March 14th, 1898.

DELINQUENT SALE NOTICE.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 9) levied on the 19th day of January, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Elizabeth A Bassett	358	800	20 00
Elizabeth A Bassett	359	800	20 00
Elizabeth A. Bassett	360	512	12 80
Elizabeth A. Bassett	361	308	7 70
Maggie Bassett	362	800	20 00
Maggie Bassett	363	800	20 00
Maggie Bassett	364	512	12 80
Maggie Bassett	365	308	7 70
A. F. Frey, Trustee	178	4,200	105 00
Wm. H. Schmidt	89	500	12 50
Wm. H. Schmidt	90	500	12 50
Wm. H. Schmidt	91	600	15 00
Wm. H. Schmidt	129	500	12 50
Wm. H. Schmidt	130	500	12 50
Wm. H. Schmidt	131	500	12 50
Wm. H. Schmidt	132	500	12 50
Wm H Schmidt	133	512	12 80
Wm. H. Schmidt	134	640	16 00
Wm. H. Schmidt	248	694	17 35
R Z. Johnson	393	700	17 50

And in accordance with law, and an order from the Board of Directors, made on the 19th day of January, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, room 44, Phelan building, San Francisco, California, on MONDAY, the 4th day of April, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from John E. Burton, in the Green Mountain Mine near Mokelumne Hill, Calaveras Co., to deposit tailings in Chili Gulch; from the Harville Mining Co., in the Harville Mine near Placerville, El Dorado Co., to deposit tailings in Martinez Creek; from A. B. Jacks, in the Badger Hill Mine near Spanish Ranch, Plumas Co., to deposit tailings in Spanish Creek; and from the Star of Plumas Water and Mining Co., in the Star of Plumas Placer Mine near Buck's Ranch, Plumas Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on March 28, 1898, at 1:30 P. M.

The State Ore Sampling Co.

DENVER, COLO.

Gold, Silver, Lead and Copper Ores and Matte sampled and marketed to the best advantage. With modern mills and machinery our facilities for sampling ores are the best.

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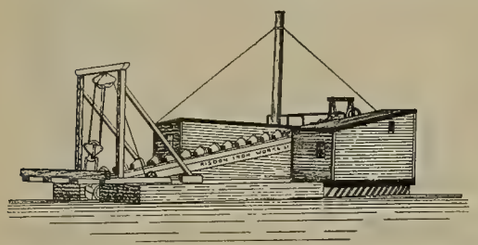
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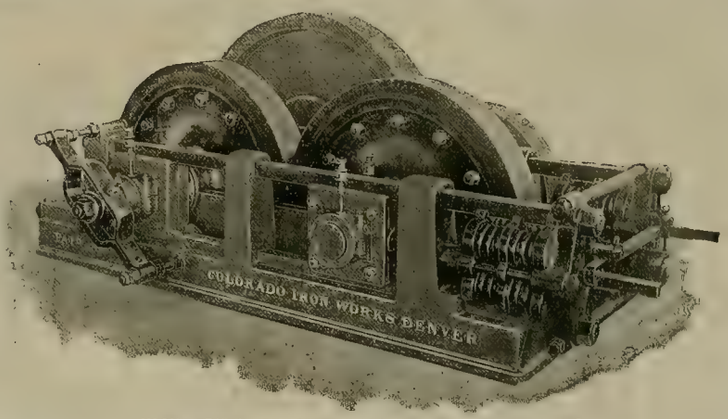
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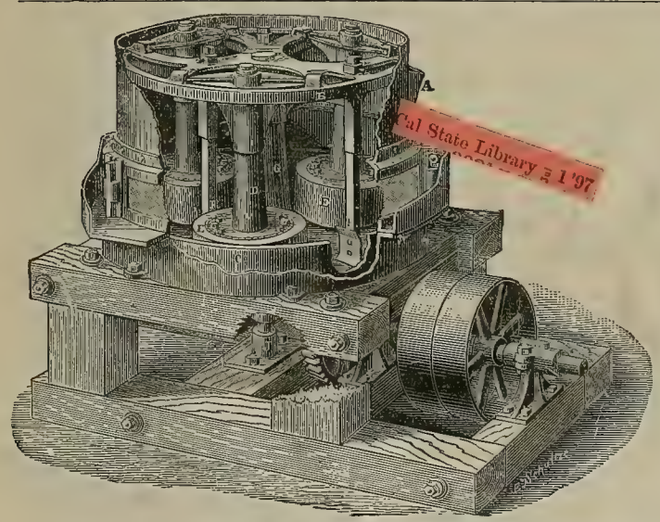
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$50 worth of work within sixty days is in conflict with the Federal law which provides that $100 worth of work shall be done within a year from June 1 ...ceeding the date of location. The other ...e $50 State requirement is wholly dis- ...ent work fixed by ...of loca-



THE ESPERANZA CHLORINATION WORKS, CALAVERAS CO., CAL.



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INCLINE AT THE MELONES MINE, CALAVERAS COUNTY, CAL.



MELONES HOIST, CARSON HILL, CAL.



THE FORD MINE, SAN ANDREAS, CALAVERAS CO., CAL.

Calaveras Co., Cal., Mines.

Calaveras county made a notable exhibit at the recent mining fair in San Francisco, and published a handsome pamphlet on its principal mines. In the present crazy rush to the Klondike men are apt to forget what they are leaving behind them, and to ignore the homely fact that the same money and effort they will waste in the frozen north would win wealth in sunny California. In Calaveras county are some of the greatest gold producers of this State, and as in other counties in California, the greatest of all, the Utica with its regular continuous yield of $200,000 per month, is "an old abandoned mine," believed to be "worked out" a generation ago, but pushed to deeper levels proved to be worth four times as many dollars as it cost cents to buy and develop it. Herewith are depicted some typical local mining scenes.

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San Francisco, March 26, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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PRESENT gold imports are noticeable. At San Francisco have arrived in the last eight months over $15,000,000 gold, mostly in English sovereigns. The incoming Sydney steamer has £500,000 on board. New York City imported $23,625,000 in gold from England and the Continent in the twenty days from February 25th to March 16th, inclusive. The House Committee on Coinage, Weights and Measures has favorably reported a bill permitting the Secretary of the Treasury to receive deposits of foreign gold coins and pay therefor its bullion value without previous melting, and, upon demand, to furnish such coin for export in exchange for United States gold coin. The present law prohibits the withdrawal of foreign gold coin from the Treasury until it has been remelted and stamped with the eagle.

AMONG those who remember is noticeable the similarity between the attractive stories of gold discovery in the Klondike in '98 and in California in '49; the same dry river beds holding large nuggets; the same mysterious valley where hatfuls of gold could be secured; the same astounding good fortune of the inexperienced man who made a fortune in a week. The old hoary lies lure in '98 as they did in '48: the difference is that California was so rich in gold that it was difficult to concoct a fable that was not made fact by subsequent events, and that its soil and climate compensated for any disappointment in gold seeking. Another similarity is that, as in the early rush to California, all kinds of crazy craft are being started, and all sorts of inferior supplies proffered Klondike pilgrims. The greed of commercial selfishness is manifest in rotten hulks, over-crowded vessels, putrid food, incompetent crews. All this was a dreadful part of the story of '49. It is already a record of the rush of '98. There are reputable men in the business of carrying passengers to the North and there are honest purveyors of supplies. Several fine vessels have left San Francisco for Alaska and several more are building. But parasitic on this whole business is a lot of conscienceless creatures who, taking advantage of the prevalent silliness among those unfortunates afflicted with the gold craze, promise more than they intend to perform and increase the perils of a dangerous trip by taking money for risky transportation and unwholesome provisions.

[illegible]le of the Questions Asked.

Every week a great many inquiries on a great many subjects are received and answered in this office, it taking one man's entire time to give personal attention to these matters, the questions being usually answered by mail. It is interesting to note the variety of topics upon which information is asked. While in every case endeavor is made to be prompt and accurate, yet in many instances it is obvious that the questions involve the possession on the part of the answerer of a greater amount of information than is ordinarily possessed by any one, in or out of the office of a technical journal. While it is gratifying of course to any paper to be credited with the ability to furnish any kind of information, on mining or industrial topics, nevertheless, it must be confessed that the honor is not wholly deserved, and that it is sometimes impossible to give satisfactory answer to the inquirer. Just to illustrate the nature and scope of these questions which are asked and answered privately through the years, a few of this month's are herewith given:

A pulley is 16 inches in diameter, the rim traveling at the rate of 180 miles an hour. It has twelve spokes 6 inches long and 1 inch wide, the shaft being 1 inch in diameter and allowing twenty pounds for friction. What will the resistance of friction and the air be on this pulley in H. P. running at the above given rate, also at 100 miles an hour?

The above, from Loyalton, Cal., was shown to an expert in his line in this city, who said just what it was expected he would say, namely: "Your inquirer has omitted the exact details of the pulley. He should furnish width, face, and thickness of rim, all the dimensions of the spokes, with a sketch."

A man writes from Independence, Colo.:

Tell me by letter (not through your paper) whether it would be possible to sink a shaft and drift under the river instead of wingdamming. Has this ever been tried?

A long article on river mining in the issue of the 19th inst. comes very near answering these questions. The method suggested by the Colorado correspondent has been tried repeatedly in California, and sometimes with satisfactory results. In general, sinking a shaft in solid ground out of the reach of high water, and placing therein a hoisting and pumping plant, then drifting out from the bottom under the flowing river into pay gravel, which is then taken out through the air shaft, has been moderately successful in a few instances where very deep ground had to be bottomed. It is considered next to impossible to keep the underground works from being drowned out or caved in, for a river bed, with its quicksands and loose gravels and boulders, is very unstable and unsafe to work under. In general, the idea is to be condemned, and if the Colorado man concludes to try it, it should be with the utmost caution, so far as personal safety is concerned, and with entire disregard of consequences or possible profit.

Another writes that he wants full information regarding, first, "the experience of engineers who make a business of examining mines and prospects; and, secondly, what per cent of mines has turned out good and what per cent poor that have been examined and passed upon by men of experience and reputation." The MINING AND SCIENTIFIC PRESS pays good prices for valuable technical articles, and would willingly pay $100 for a complete, authentic and satisfactory article in answer to the above question. As will be observed, it involves the entire theory and practice of mining and practical results therefrom.

A Rossland, B. C., correspondent says he wants to know "how to keep timber for underground use from decaying."

Where timber wets and dries it is hard to preserve it. Several methods are in use for the preparation of timber for underground use where desired to be preserved from decay. The creosote process is probably the best. The wood is placed in an air-tight tank, a vacuum formed, and creosote pumped in at a pressure of 150 pounds per square inch, at a temperature of 120 F. Soft wood will absorb from eight to ten pounds per cubic foot, hard wood from six to eight pounds. Steeping in naphthaline is also attended with good results, especially in the case of green timber. A mixture of salt and chloride of magnesium for dry wood will preserve it, and also render it incombustible. This last is probably the most practicable for our correspondent's purpose.

He also wants to know how to clean copper plates.

When copper plates are stained with verdigris, which prevents their amalgamating with and saving the gold, the plates can be cleaned in the following manner: Thoroughly scrub the plates with fine sand and water, using a coarse gunny-sack or scrub-brush. Wash off the sand and then scrub thoroughly with a solution consisting of one part oil vitriol and four parts of water. The acid disintegrates the verdigris, dissolving the oxide of copper, and leaves the plate clean, when it will readily amalgamate with mercury without the use of cyanide solution, except the acid solution should have been made stronger than herein prescribed, in which instances the plate should be washed off with water, and then dressed with a solution of cyanide as usual.

A Grass Valley, Cal., man wishes "some way to tell approximately, off hand, how much proportionate sulphurets there are in quartz."

A practical formula for estimating the percentage of sulphurets in quartz is as follows: Take 10,000 grains or 20.8 ounces of crushed ore, which will pass through a 40-mesh wire screen. Wash the ore very carefully in batea or pan and rewash as long as sulphurets appear. Dry and weigh. Each grain of sulphurets will equal one one-hundredth of one per cent. If the sulphurets weigh 175 grains, the quartz contains one and three-fourths per cent of sulphurets; or, if twenty grains, one-fifth of one per cent. If the sulphurets are worth $100 per ton, the value of sulphurets in each ton of ore is $1.75, or one-fifth of one per cent—20 cents per ton. To test tailings, dry and weigh 10,000. Wash as above. Dry and weigh the sulphurets. Each grain will represent one one-hundredth of one per cent and a loss of one per cent per ton if the sulphurets are worth $100 per ton. Thus, if the 10,000 grains of tailings yield three and one-half grains of sulphurets, the loss is 3½ cents per ton in sulphurets. If the sulphurets are worth $60 per ton, multiply sixty by three and one-half, and 2.1 cents is the value of the sulphurets in one ton of tailings. If they are worth $375 per ton, multiply as above, and the value in each ton of tailings is 13.12 cents per ton in sulphurets.

From Rossland, B. C., a subscriber asks:

1. What is the best pulverizing machine to grind ore to a fineness of 80 mesh, and what is the capacity?
2. What is the amount of water required per ton of ore for Frue vanners and also revolving slime tables?
3. What is the cost and capacity of the latter?

The first is not susceptible of positive statement in this column. The answer to the second and third can be secured by addressing Jas. S. Brownell, 132 Market St., San Francisco.

From Middletown, Idaho, a subscriber says:

I want a simple, practical test for gold in refractory rock by which approximately correct estimates of the amount of gold to amount of rock can be made. I want an acid test. Is there a fluoric acid test? Is there a cyanide test?

Some of our many thousand readers can doubtless furnish what is asked.

A Fresno, Cal., man asks if there is such a thing as a Bureau of Mines, or something of that nature, in this State. He says he is a prospector and wants to be assisted in the determination of unfamiliar minerals. If he will send his specimens to E. M. Preston, State Mining Bureau, 24 Fourth St., San Francisco, they will receive prompt and competent attention.

A Bishop, Inyo county, Cal., prospector asks: "Is the Yosemite reservation open for prospecting and mining?" It is.

From Eureka, Wash., is asked: "Will putting up buildings and machinery for work on a claim count for assessment work?" Undoubtedly, if accompanied by such other work as would necessarily go with the erection of such a plant, and if done in the required time.

A Shasta Co., Cal., mining superintendent asks if it is so that he must pay his employes every month. An act approved March 29, '97, says that "every corporation doing business in California shall pay at

least once a month each and every employe employed by such corporation in transacting or carrying on its business, or in the performance of labor for it, the wages earned by such employe during the preceding month." This is a sweeping law. It will be noticed that it includes "every corporation," regardless of what business the corporation may be engaged in. Of course, mining corporations come under this law. A test case was made in Mendocino county immediately after the passage and approval of the law, and on July 2, '97, the Mendocino county Superior Court sustained its constitutionality.

A Bannack, Mont., subscriber wants to know what kind of hydraulic mining it is that is known as "booming" with a "shooter."

A Trinity county, Cal., correspondent thus described it: "A peculiar feature used in this end of the State to assist the placer and hydraulic miner is what is known as a 'shooter.' It consists of an automatic reservoir of various sizes and shapes, that collects all the water not run through the 'giants' or 'monitors' for, say, fifteen minutes, (as in the case of this mine), and then a valve automatically opens of sufficient size to allow all the water thus collected to escape in five minutes, thus obtaining the use of over 20,000 inches of water for five minutes that 2000 inches has furnished by cacheing it for fifteen minutes. I saw the above force of water carrying boulders weighing over 500 pounds through one mile of flume in five minutes. Nearly every hydraulic mine in these northern counties is equipped with one of these 'shooters.' On the Boss & McClary placer mine, adjoining Trinity Center, the 'shooter' box is 20x40 feet square and 6 feet, with an automatic opening of 18 inches by 4 feet. They have a bedrock flume 6 feet wide by 3 feet deep, nearly half a mile long, lined with 9-inch blocks."

On this subject a prominent California mining engineer has written that it was in northern California that the style of hydraulic mining known as "booming" was first introduced, and has since been most largely in use. It is practiced only along the gulches. These affording but little water, it became necessary that the limited supply be reservoired and properly distributed in order to make it effective in this method of gravel washing. The object is attained by retaining the water in dams and then releasing it suddenly, with a rush or boom. Near the bottom of the dam built for this purpose is left an aperture so large that when opened the water escapes rapidly. Placed on the top of the structure is a small race, through which the water flows when the dam is full, and is discharged into a large wooden box suspended from the end of the sweep, turning on a pivot, and the upper end of which extends to and over the top of the dam. Attached to this end of the sweep is a strip of heavy canvas which, dropping in a fold over the aperture below, keeps it tightly closed when the dam is full. When this stage has been reached the water flowing through the race into the wooden box mentioned soon fills it, causing this end of the sweep to sink and the other to rise, carrying with it the strip of canvas and uncovering the large aperture below, allowing the water to rush out. Meantime, the wooden box, having emptied itself through numerous small holes made for the purpose, this end of the sweep, relieved of its weight, rises, and the other end drops. The canvas falls over the outletting aperture, closing it as before. Then the dam fills again to the brim, and the operation as above is repeated. This plan for handling water is wholly automatic. It takes care of itself and goes on day and night, without any attention on the part of the miner, doing its work as long as the water lasts. This is one of those ingenious contrivances for which the California miners have ever been noted. Since its introduction in the northwestern part of the State, it has been brought into use in many other places, some of which have presumed to claim its paternity, a distinction that unquestionably belongs to this State, where this device was originally known as the "self-shooter." While to us belongs the credit of this invention, to others belongs the credit of having substituted for the above name the more appropriate one by which it is now known.

An inquiry from Ellensburg, Wash., is regarding how and what the U. S. Mint pays for gold.

The Government pays for gold at the rate of $20.67 per ounce fine, or $18.60 per ounce standard (.9 fine). There is no charge for coining gold. When the bullion deposited is not suitable for coinage, and requires parting and refining, charges are made for these operations equal to the expense incurred in eliminating the base metals and parting the gold from the silver when the two metals are combined. There is also a charge of 2 cents per ounce for copper required for alloy. Upon gold bullion of standard fineness—that is, containing .9 gold and .1 copper—no charge whatever is imposed. The depositor of gold bullion is allowed 100 cents for every 23.22 grains Troy of pure gold his deposit may contain.

A San Francisco reader sends in the following:

Take a car with a truck under each end and the car running on a level. The brakes are applied to one truck only. In one case that truck is on the front end of the car; in the other case the car is going in the opposite direction, so that the truck with the brakes applied is on the rear end of the car. In which case, if in either, would the brakes be most effective in stopping the car? In other words: everything else being equal, would the brakes on the rear end of the car be more effective than on the front end?

An intelligent reply to this question will gladly be published.

A Leland, Oregon, inquirer asks: "Does the O. & C. R. R. Co. offer all their mineral land for sale at $2 50 per acre? Do they reserve all minerals except coal and iron in their deeds? It is understood that they do; but a letter addressed to F. Kohler, Portland, Oregon, asking for a blank form of deed, will give the required up-to-date information.

A Tuolumne county, Cal., subscriber says he has a mill to be erected on his mill site, but other people have located it, and asks can they hold it. That depends. He apparently does not give the entire facts. If it is "his" and he can prove that, they certainly cannot.

Another man from the same section writes: "I locate a piece of ground and another party builds a dam and ditch on the property to convey water on to his ground. Can the work so done be used by me as assessment work in securing patent?" No.

A Kingman, Arizona, reader wants to know how to "brighten up" his amalgamating plates. Silver-plated amalgamating plates, to give good results, must be clean. Cleaning these plates with a weak solution of cyanide of potassium or a strong solution of salt and water, using a brush with each, is recommended. The introduction into the battery of a saturated solution of wood ashes neutralizes grease or oil. Cyanide of potassium in dilute solution is used to promote amalgamation, but the practice of using the cyanide is less common than formerly. One or two pounds will be sufficient to clean the plates of a 40-stamp mill for a year. Some use a solution of vinegar and salt for cleaning plates. Very dilute nitric acid is also used, the plates being at once rubbed with quicksilver after being washed with clear water. The quicksilver itself is carefully washed and strained through a canvas bag to remove as many impurities as possible and again strained. On a small scale, it can be strained by hand through a chamois bag. When it becomes dirty or mixed with foreign substances, it must be retorted at a low temperature to thoroughly clean it.

An Anaheim, Cal., reader wants mining maps of the different counties of the State, showing their mineral resources, etc. It is understood that such maps are in process of preparation at the State Mining Bureau in San Francisco.

A Randsburg, Cal., man wants to know, "if a miner locates a mine under the mining law of May 26, 1897, and does not do the required $50 worth of assessment work in sixty days, does he forfeit his claim, and is it then open for relocation?"

This is the most important legal question of the whole lot received, and one that everybody hesitates to answer authoritatively. A lawyer who is looked upon as authority in all these matters, to whom the question was referred, gives the following reply:

The profession are divided in their opinion on this question. One view is that the State law requiring $50 worth of work within sixty days is in conflict with the Federal law which provides that $100 worth of work shall be done within a year from June 1 next succeeding the date of location. The other view is that the $50 State requirement is wholly disconnected from the annual assessment work fixed by the act of Congress. It is one of the acts of location. The provision is of the same character as is found in most of the mining States and Territories requiring the sinking of a discovery shaft within a specified time. In California the character of the preliminary work is not defined, but its value is fixed, leaving the locator his choice as to manner of development. The validity of the "discovery shaft" laws has never been seriously questioned. They have been in force for many years in several of the States. If these laws are valid, there is no reason why the California law should not be upheld, as it belongs to the same category. If valid, a failure to comply with it would render the claim subject to relocation.

A Murphys, Cal., subscriber asks if he posts a notice within three days after bonding his mine would he be held responsible for any debts created; or whether if after posting his notice he would only be responsible for the debts created before he posted his notice.

Upon bonding or leasing a mine the owner must immediately give sufficient public notice under the Mechanics' Lien law that he will not be responsible for debts contracted by the bonder or lessee. We cannot undertake to be more than general in this matter; and where any complications arise on this or kindred subjects our advice would be to secure the services of a competent lawyer.

A Coulterville, Cal., man wants to know how deep the Idaho-Maryland mine at Grass Valley is. From a diagram furnished by the Supt. of the mine it is 3100 feet on the incline; about 2200 feet vertically. The Kennedy mine, Amador county, Cal.—2400 feet—is the deepest mine in the State.

A Denver assayer wants a complete account of refining and coining in the U. S. Mint. An elaborate serial entitled "From Mine to Mint," giving a full description of much that the Denver man asks for was published in Nos. 20, 21, 22, 23, 24, 25 and 26, Vol. LXXIV. The mint method used in the San Francisco mint is based on a process patented by Pike. It is interesting in connection therewith that Pike sold his patent over forty years ago to the U. S. Government, the price being a steady job in the mint at $7 per day—a position that he has faithfully filled for over two score years. Data on mint methods of the local mint are now being procured and will shortly be published herein.

The above by no means embraces the entire list, but serves to illustrate a phase of the conducting of a journal that is not often given publicity.

A KASLO, B. C., PAPER has some lengthy arguments against this country's duty on lead and lead ore, and in favor of the Canadian government raising the tariff on lead to a figure at least equal to that of this country, in hopes of creating a smelting industry in British Columbia and "preserving the Canadian market for Canadian lead." The subject is one which will be thoroughly discussed in Canada. It may be said that before the present United States duty on lead ore—which is so strongly objected to—was imposed British Columbia was netting $1.75 per hundred pounds for its lead imported into this country, and is now netting $2.10.

CALIFORNIA CONGRESSMEN have argued favorably before the House Committee on Mines for the creation of a new Cabinet position to be filled by a Secretary of Mines and Mining, and a favorable report is expected. It is thought in some quarters that it would be advisable to abandon the project and try to secure the creation of a Commissioner of Mines. This subject will be discussed at a meeting of the Executive Committee of the California State Miners' Association in San Francisco on the 28th inst.

THE International Mining Convention which organized at Denver last June will meet in Salt Lake City, Utah, July 6th, '98. A good start was made at Denver, and the Salt Lake meeting promises to be of value to the miners in this west half of America.

The Kern River Electrical Enterprise.

In the Los Angeles, California, *Times* of January 15th, '98, appeared some statements regarding the electric power enterprise of the Kern River Company, which proposes to bring power to Los Angeles from the Kern river, a distance of 108 miles, which will be the longest power transmission line in the United States, with the exception of the scheme noted in last week's issue of this paper, which proposes to bring power from the high Sierras, a distance of 120 miles, to San Francisco.

A Mariposa correspondent of the MINING AND SCIENTIFIC PRESS made some criticism on the plans of the company as decribed from a technical standpoint, which appeared in the MINING AND SCIENTIFIC PRESS of February 12th. In the Los Angeles *Times* of February 26th appeared an answer to our Mariposa correspondent, which assumed that the original statement, as it appeared, was not subject to the criticism which he made and which sharply opposed his views. In further substantiation of his original criticism, our Mariposa correspondent writes as follows:

"I am not specially interested in the matter, but it is illustrating the tendency of the lay press to put forth very unreliable statements. The rejoinder in the Los Angeles paper principally objects to my use of the word 'turbine' in its colloquial sense. With all due deference to the Century dictionary which it quotes, I must maintain that custom, trade practice and technical literature often constitute a higher authority than the dictionary for limited and special application of their terms, and while in the eye of Professor Whitney any reaction wheel was a turbine, the term is not to-day in common use as applied to wheels of the Pelton, Knight and Girard types. The paper tries to make it appear that I said turbines were never used under certain heads. What I said was that 'modern practice rarely sets turbines under heads exceeding 60 to 75 feet,' and the statement is not disproved by citing the only notable exception to the rule, the Niagara turbines. To help my critic out I will add that I recall the installation in Washington some six or eight years ago of a small turbine under a head of some 160 feet, to furnish lights for the Stampede tunnel. I mention this to show that I used the word 'rarely' advisedly. Probably some of the recent electrical installations on this coast present as fair an exposition of best hydraulic practice as can be had. For instance:

Plant—	*Feet Head.*	*Type.*
Portland, Or.	40	Turbine.
Folsom, Cal.	55	Turbine.
Bodie, Cal.	350	Pelton.
Bakersfield, Cal.	202	Girard.
Fresno, Cal.	1410	Pelton.
Redlands, Cal	530	Pelton.
Pomona, Cal.	300	Pelton.
Redlands (No. Cal. P. Co.).	725	Pelton.
Murphy's, Cal.	500	Pelton.
Dalmatia, Cal.	110	Pelton.
Gover, Cal.	340	Pelton.
South Yuba, Cal.	206	Pelton.
Blue Lakes, Cal.	1043	Doble.
Newcastle, Cal.	460	Pelton.
Salt Lake, Utah.	380	Pelton.
Aspen, Colo.	330	Pelton.
Utah Power Co., Utah.	435	Pelton.
Butte, Mont.	56	Turbine.
Helena, Mont	29	Turbine.
And the later compressed air plants—		
Massachusetts Hill, Cal.	775	Pelton. (19½ ft. diam.)
Gwin, Cal.	420	Pelton. (19 ft. diam.)

"It will be noticed that in the above list are but four plants which use turbines, and none of these under a head equal to the limit I placed.

"I am pleased to know that the company is not hoping to accomplish much in the way of equalizing the flow of the Kern by storing in its 42,000-acre-foot reservoir, but it was distinctly so stated in the article to which I took exception and which the Los Angeles paper says was 'detailed and authentic.' Without discussing the matter of 'scientific literature,' my note was written with all the thus far observed measurements of the Kern river at hand and the facts are as I stated. The article which I criticised read: 'This water will be caught during the time of winter floods and will not only abate their violence but will afford sufficient water to increase the summer flow of the Kern river by nearly 50 per cent continuously during the period of low water, thus increasing the capacity of the company's power plant by that amount as well as conserving the water supply of the whole adjacent district.'

"There are no winter floods to abate anyway, as already pointed out, for the average flow of the river from September 1st to April 1st is below the mean annual flow, and the value of a 42 000-acre-foot reservoir to 'abate the violence' of Kern floods when they do come may be estimated from the fact that the flow of the river in May, June and July of 1884 is reported by Hall to have been 1,250,000 acre feet, sufficient for filling this reservoir every three days for three months. Similarly, to 'increase the summer flow by 50 per cent' would require 2000 acre feet per day on the basis of the average flow of May, June, July and August, as observed for six years. The reservoir would stand the strain 21 days instead of 120, and so on ad nauseam. That the engineering studies of the situation have been ample and able, I have no reason to doubt; it was a newspaper rehash of them that I criticised as typical of just such trash that goes the rounds."

This whole matter is given here to emphasize two points: first, that it is just such criticisms as this of our Mariposa correspondent that are of most value to contemplated enterprises of that nature—not written in a carping, censorious way, nor intended to be merely captious criticisms, but pointing out exactly and technically the requirements of the situation and the mistakes liable to be made by loosely constructed language or loosely constructed notions in the minds of the projectors; and second, that much of the so-called scientific miscellany and statement that appears in the daily press cannot stand the scrutiny of close, technical observation.

It is the belief of the MINING AND SCIENTIFIC PRESS that instead of taking umbrage at the merited strictures of our Mariposa correspondent, the authors of the article in the Los Angeles *Times* should be thankful for having their mistakes pointed out. It is vastly easier to remedy such mistakes when they reach no further than paper than when they assume the expensive form of misconstructed work based upon mistaken assumptions.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER X.

By GEO. F. BECKER.

In the United States.—The marine Triassic conglomerates which lie to the eastward of the auriferous area of the southern Appalachians contain a little gold. This was barely mentioned by Mr. Jules Marcou in 1862. In 1894, without knowing of Marcou's statement, I came to the conclusion that these conglomerates must be gold-bearing, and determined to test the matter. I found that mining on a very small scale had been done three miles northwest of Moncure, Chatham county, North Carolina. The pit may measure 100 cubic yards and is said to have yielded a little gold. I took samples from the cement and found gold in them with the pan. The conglomerate contains pebbles as large as a man's head, consisting of quartz, granite, schists, and porphyrite.

Gold was discovered in the Black Hills of Dakota in 1876 and caused some excitement among miners. The gold occurs in a marine conglomerate at the base of the Potsdam (Upper Cambrian). According to Mr. Henry Newton, the pebbles are quartz, quartzite, and some of the harder schists of the unconformably underlying, metamorphic rocks. The gold dust is very fine and its "concentration was begun by the shore action of the Potsdam sea." Mr. W. R. Devereux says: "The horizontal character of the sediments, and the fact that their accompanying life forms belonged to salt water types, leads us at once to the conclusion that they were ocean sediments and not river beds, and that they were formed in very shallow water, where there was strong wave action." The same authority remarks that there are pebbles of hematite and that the cement is oxide of iron; the ore needs stamping; the gold is found in smooth, rounded, flattened grains, ordinarily coated with iron oxide; the deposit is richest at bedrock and is said to have milled as high as $50 per ton; one nugget of three pennyweights has been found. It seems to me highly probable that the hematite pebbles and the ferruginous matrix represent decomposed pyrite. It will be observed that the largest nugget reported is trifling in size compared with those common in river gravels. Mr. Waldemar Lindgren tells me that this conglomerate extends down into Wyoming, and is said by trustworthy local informants to be auriferous on both sides of the Black Hills of Wyoming. This conglomerate would appear to be the nearest analogue to the Witwatersrand gold field.

There is also an auriferous conglomerate at the Bald Mountain district, in the Big Horn range, in the extreme northern part of Wyoming. Bald mountain lies in about latitude 44° 50′, longitude 107° 50′. This pudding stone seems to have been worked since 1893. It is considered Silurian by Prof. W. C. Knight. Mr. G. H. Eldridge has visited the locality and colored it on his maps as Cambrian, but had no time to make a satisfactory examination of the occurrence. Other accounts represent it as agreeing in general character with Mr. Eldridge's basal Cambrian conglomerate. I have understood that there is an auriferous conglomerate in New Mexico, but have not succeeded in obtaining any information about it.

In California three pre-Tertiary auriferous conglomerates are known. Mr. Lindgren has described one which forms a member of the Jurassic Mariposa marine beds. It occurs in Placer county, on the ridge between the north and middle forks of the American river, at an elevation of 2100 feet, and is many yards in thickness. The pebbles are phthanite and limestone, with quartz in variable quantities. There is no black sand, but much pyrite in the rock, which is a shore deposit. Mr. Lindgren made numerous tests of this conglomerate as exposed in a small shaft, and invariably found one or more colors to the pan. The locality is especially interesting because the main era of gold vein formation in the Sierra is later than this conglomerate, while its existence proves that there was also an earlier era of deposition.

Close to Folsom there is a stratum of conglomerate at the base of the Chico (Cretaceous), which carries some gold and has been worked on a small scale. There is every reason to believe this a marine shore deposit, near, of course, to the mouth of some stream which brought down the auriferous material.

Mr. R. L. Dunn has described an auriferous conglomerate in Siskiyou county, California, which is at least ten miles in length, and, like that at Folsom, lies at the base of the Chico, of which it is a member, resting unconformably on the metamorphic rocks. It has an average thickness of 100 feet, and most of the pay is near the lower surface. The gold is both coarse and fine and is accompanied by hematite and pyrite. Mr. Dunn regards this conglomerate as river gravel, but Mr. J. S. Diller tells me that those portions which he has examined within the area mapped by Mr. Dunn have the physical and stratigraphical characteristics of marine deposits, and, furthermore, they contain marine fossils, which renders further argument needless. Nevertheless, at some point or points there may be submerged river gravels, such as Mr. Dunn supposes, though the evidence which he adduces is not convincing. Mr. Dunn states that a conglomerate in the same geological position as far south as Redding is also auriferous, and that at Ashland, in southern Oregon, a conglomerate has milled $5 per ton in free gold.

In British Columbia no pre-Tertiary auriferous conglomerates are yet known to exist, though Dr. George M. Dawson suspects their presence and has made tests, thus far with negative results.

The most westerly auriferous conglomerate discovered in America occurs along the headwaters of Forty-Mile creek, which is a tributary of the Yukon, in Alaska. The creek joins the river about latitude 64½°. The conglomerate in question was first recognized as auriferous last July by Mr. Josiah Edward Spurr, of the United States Geological Survey, and no account of it has yet been published.* It forms the basal number of a heavy series of rocks believed to be of Cretaceous age. The basal conglomerate is in the neighborhood of 100 feet in thickness; it is of marine origin and rests unconformably on metamorphic rocks. It has never yet been worked for gold, and the evidence of its auriferous character rests upon the sudden enrichment of the streams which cut through it.

In Australia.—The earliest discovery of auriferous conglomerate in Queensland was, I believe, at the Peak Downs district. In 1870 Mr. Richard Daintree wrote: "The miners use the Carboniferous sandstone, the Glossopteris bed at the bottom, and take the cement several inches from its junction with the Glossopteris bed for their wash dirt."

The cement is conformable with this bed. The gold is waterworn. Similar occurrences are known in New South Wales. The Rev. W. B. Clarke, in 1875, discovered gold in the Carboniferous conglomerate of Tallawang, Phillip county, New South Wales, and at other localities. Mr. C. S. Wilkinson states that these conglomerates are associated with sandstone and shale containing Glossopteris.

Mr. Harrie Wood writes: "The conglomerate [of Tallawang] yields from one to fifteen pennyweights of gold per ton, while nuggets weighing five ounces have been obtained from it. The gold is generally in the form of flat scaly pieces, and waterworn. At Cooyal, and other parts of the Mudgee district, waterworn gold occurs in coal measures. Gold has been discovered in the marine conglomerates and shale beds, which are believed to be of Cretaceous age, and which rest upon the flanks of the Silurian, Devonian, and granite formations in the Mount Brown or Albert gold fields."

Mr. Wilkinson has also recorded the existence of a gold-bearing conglomerate at Gulgong, Phillip county.

Mr. Clarke found gold in the coal measures in the southern part of the colony near Shelleys Flat, Shoalhaven, prior to 1860, and as far back as 1855 a quartz pebble from the Carboniferous showing gold was detected by Sir Thomas Mitchell. The Australian Carboniferous contains an abundance of marine fossil Mollusca.

*Eighteenth Annual Report Mineral Resources of the United States.

Since the above was written Mr. Spurr's elaborate report has appeared. From advance sheets the MINING AND SCIENTIFIC PRESS was enabled to publish the salient points. It appeared in Nos. 4, 5, 6, 7, 8 and 9 of the present volume.

(*To be Continued.*)

ANTIMONY is found in this State and Utah in the form of a sulphide (stibnite). It is used as an alloy with other metals and, to a large extent, with lead in the manufacture of type metal, to which it gives hardness. A valuable feature is that it possesses the peculiarity, when used as an alloy, of expanding at the moment of solidification, thus giving to the types a clean, sharp impression. It is also used in making Britannia metal, Babbitt metal and pewter, and as an alloy with aluminum, to which it imparts hardness and elasticity. The medicinal preparation—tartar emetic—is a tartrate of antimony and potassium.

Preserving the Forests.

By W. E. WILSIE, Ventura, Cal.

When apparently there are no forests within 500 miles of us, it would seem folly to discuss a subject so foreign to our interests. But may it not have a redeeming feature? It may, upon investigation, prove to be a larger subject than at first thought it appears. The measly brush that covers our mountain slopes are our forests; the greasewood and the manzanita, the lilac and the sage brush, the scrubby oak and the towering pines.

This question of forest preservation conserves our water supply. It is a question that directly interests people in southern California. It is a question that every man, in whatever branch of industry he may be employed, should carefully study; every water company, every power company, every railroad company—in fact, everybody in southern California—should stop and ask themselves this question, for it is of vital importance to our interests here.

Nature's Reservoirs.—Whence comes this water with which we are supplied during our long dry seasons? Usually, the people get their water from the water company and it from the mountain streams. But where is its source of supply? Nature's reservoir. Our forests are the cover to this. Above and around our beautiful valleys are high mountains, whose slopes are covered with a thick forest growth which shades the surface and whose fallen leaves and twigs form a thick, soft blanket covering, which takes up the moisture as it falls and retards evaporation thereafter. Nature has given us this reservoir, furnished the water and expects us to keep it in repair. For years, while the country was settling up, this reservoir furnished such an abundant supply of water that the people failed to properly guard it, until now, when we need more and examine our reservoir, we find it has a leak. It doesn't hold water as it once did.

Why the Reservoir Fails.—This leak is the destruction of the forest growth, the lifting, as it were, of this blanket covering of leaves and mould from the surface of the mountain slopes, thus allowing the moisture as it falls to run off rapidly, washing great ravines, etc., as it comes tumbling down the mountain sides to join neighboring waters in the destruction of property, as it rushes madly on into the sea, when it should have been retained in this mountain reservoir to be drawn from as it was needed during our long dry seasons.

This destruction is caused by negligence, carelessness and recklessness on the part of the people. These mountains are ours, and it is for us to say whether this destruction shall go on or whether this forest growth shall be preserved.

We allow sheep to range over our mountain slopes, ranging from place to place, destroying young herbage and seedlings, and, by the trampling of their sharp hoofs, the surface of the ground is soon changed so no seed can germinate. Then comes the irresponsible herder and burns the mountain sides, that the sheep may have young shoots to browse upon the following season. Thus the forest is soon doomed to destruction. It is gross negligence on the part of the people to allow this. Not that the business is illegitimate as such, but, carried on as it is, it is incompatible with all the other interests which the foremost may subserve; just as the proverbial incompatibility of the goat and the garden, so is the growing of wood and wool on the same ground.

Through indifference, we allow fires to burn all over our mountain sides with but a passing thought, and no care as to the consequences. Reckless campers and hunters burn many thousand acres of forest cover of our mountains annually. The great watersheds of southern California are fast becoming denuded of their forest cover, and, if it is not stopped, our water supply is in danger of becoming materially less.

Forest Reservations.—This leak must be stopped. The Government has seen this, and Congress has already passed an act providing for the setting apart of portions of the public domain in forest reservations, to the end that this forest cover may be preserved.

I quote from B. E. Fernow, chief of the division of forestry of the Department of Agriculture, who, in a pamphlet entitled "The Forest Reservation Policy," says: "The forest and brush cover of the mountains in the country west of one hundredth meridian occupies a small portion of the total area, probably not more than 35 per cent. The timber of useful kinds occupies hardly 15 per cent of the whole. The distribution and character of this growth is extremely variable, from the chapparal and stunted growth of southern California and the open pine and cedar and spruce of the lower Rocky mountains to the magnificent world-famed giants of the Sierras and the dense unmatched forest growth of the Cascade and the Coast range in northern Oregon and Washington. Corresponding to the difference in distribution and development of forest growth, the climate varies, especially with reference to moisture conditions. The northwestern portion of the Pacific coast has an abundance of rainfall and high relative humidity; the southern portion and lower Rocky mountains are more or less arid. In either section a forest cover of the higher elevations and slopes is needful; in the one case to hold back the snow and rain water from inundating the agricultural lands below, in the other to preserve the scanty water supply by impeding evaporation."

The Government is ready and willing to help us in this matter. Let us have set aside as a forest reserve the mountain portions of southern California. It will be done for the asking. It looks like a big thing to ask for, but let us ask great things and expect great things. I have heard it said that if a person really would make up his mind to do a certain thing he could do it. If the people of southern California really made up their minds that they want the forest growth preserved on their higher mountain slopes, they can have it. All they have to do is to say that they want it, and they will get it, for the department already recognizes the necessity for it. There is only one man it would hurt and that is the sheep herder, and it would be far cheaper to give him a pension and let him retire to some quiet country town, there to spend the balance of his days in peace and plenty, than to give him free access to our mountain reservoir, and there, through recklessness, destroy what Nature intended for the people.

Conness on Cams.

A good many old Californians will remember John Conness, who got 31,000 votes here for Governor in 1861. He is now living in Boston, Mass., and, of an early change that was made in the mechanism of the cams in a stamp mill, says:

"Once in my California life I invested in one of the rich mines on Amador creek, where Hayward obtained his first fortune. He was a placer miner in El Dorado, near where I lived. At that time there was one stamp mill in place and at work on Amador creek. It was of an English pattern. The shafts of the stamp were square beams of wood, not less than eight or ten inches square, and the cams ran into mortises in the shafts, by which the stamps were lifted. I was one of two appointed by our company to go to San Francisco and have a mill made to work our lode. Observing the Amador mill work, and noting its clumsiness, and afterward, on the way down the Sacramento river on the steamer Confidence, observing what are called the lifting rods of the engine rise and fall through metallic boxes smoothly and wholly without friction, I adopted the plan of having the shafts of the pestles made of iron, turned smoothly and run in metallic boxes, like those on the engine of the steamer Confidence. A shoulder was keyed on the shaft or lifting rod, so that the cam could lift readily; but as the shaft or rod was round, and so that the lift might be done by a hold on both sides of the rod against the keyed shoulder, we had the cam made with two arms instead of one, just like two of your fingers. The mill was erected and it worked beautifully.

"Now, one of the difficulties of the English-pattern mill was that the stamp rose and fell perfectly straight. It worked between two heavy beams of wood, which were horizontally placed to keep the rise and fall of the pestle within its narrow bounds. The result of this was that the ore or rock would get into the angles of the mortar and the faces of all the pestles would become worn unevenly, and, finally, either side of a pestle would look like a wedge and fall with a thud, not doing its work of pulverizing the ore. The pestles were constantly being removed to be cast over and as often wearing unevenly on their faces.

"Our mill being round and swinging a little to the right and left, and, as you will see, having no lateral beams keeping square pestle rods rising and falling perpendicularly, was a great improvement on the face-wearing plan, which was seen at once. But one day one of the cams lost one of its forks, or fingers, by breaking off at the junction, and at once the stamp, while it raised with perfect ease, had an increased swing, rotating from one side to the other; and its face, having an equality of wear, did its work beautifully. There was no crowding of the ore from one side of the mortar to the other; it was a mechanical revelation. We had all the cams made with one finger or wing, and that did more for quartz mining than was ever accomplished in any other way.

"Our company employed one of its members—a lawyer—to superintend and do the work. There was neither let nor hindrance to his management, but in a year or two we closed up the mine, assessed ourselves, paid the debts and quit. A. H. Rose took the mine afterward and made a great fortune out of it. I had much experience in mining and put a good deal of money in it, and what I learned was that the best mine in the world could be frittered away for want of good judgment in its management."

C. H. MCCORMICK of Victor, Colo., has invented a new danger signal for use in connection with vertical shafts to automatically indicate at which level the cage is. Near the shaft is a lamp stand located in the drift. This stand has a vertical column rotatable a quarter turn, effected by a rack and pinion gear, the rack arranged to move in guides, the stem of the rack extending and connecting with a bow spring secured near the guideway of the cage. The bow of the spring projects within the path of the cage. The lamp is placed on the rotatable stand, and has white lights oppositely placed and colored lights oppositely placed on the other side. Normally, the colored lights are displayed, showing the absence of the cage from that level. When the cage arrives at any level it impinges against the bow spring, causing the latter to straighten and thrust the rack bar to turn the white light. As long as the cage stops there the white light is displayed, but when the cage leaves the level the spring will resume its bow form, drawing the rack bar and causing the shaft to give a quarter turn to display the colored light.

Gold Deposits, Geology and Geography of Alaska.

NUMBER II.

It is in the Forty-Mile district and the adjoining mining district on tributaries of Sixty-Mile creek that the relations of the different gold-bearing series are best seen. Here there is an east-west axis or backbone running parallel to the upper part of Forty-Mile creek and along the divide between it and Sixty-Mile creek, with quartzite-schists of the Birch Creek series resting immediately on it both to the north and to the south. Above these on either side are the marbles and alternating schists of the Forty-Mile series. Forty-Mile creek below the fork runs for a considerable part of its course along the junction between these two series, on the northern flank of the anticline. Dikes of various eruptive rocks, including intrusive granite, are very abundant, especially on the South Fork. On the upper part of this fork are green tuffs and slates of the Rampart series, overlain unconformably by granites, sandstones, and coaly shales of the Mission Creek series. Both the South Fork and Sixty-Mile creek are supposed to head in a backbone of granite around Sixty-Mile Butte, which is surrounded by quartzite-schists of the Birch Creek series. These regions lie partly in American, partly in Canadian territory.

Canadian Territory.—The Canadian area has not been studied by American geologists, except in wayside observation along such routes of travel as necessarily lay through it. The Canadian geologists, on the other hand, did not in their earlier and published observations recognize any subdivisions in the older rocks such as have been made by Spurr. Hence it is not possible to attempt even a proximate outline of the Canadian gold-bearing rock formations. General geological data and local discoveries of gold-bearing gravels indicate that the gold-bearing area is very large, and may be roughly defined as reaching from Dease river to the boundary, with a width of 200 to 300 miles or more. The recent enormously rich discoveries have, however, been confined to a more limited area around the Klondike and Stewart river districts, over which it has been possible to extend, with a reasonable degree of probability, the colors indicated on the map for adjoining American areas. Thus it is assumed that the east-west uplift of fundamental granite and overlying rocks extends eastward into the Klondike district, and that a second uplift in a southeasterly direction extends from upper Forty-Mile Creek toward the valley of Stewart river.

Spurr noted outcrops of the schistose quartzites of the Birch Creek series for a large part of the distance from the mouth of Forty-Mile creek up to the junction of the Pelly and the Lewes at Fort Selkirk; also granites at various points, in some cases schistose like the fundamental granite, in others fresh and massive like intrusive granite. There were also occasional belts of marble belonging to the Forty-Mile series, notably one five or six miles above the mouth of Sixty-Mile creek, not far from that of Stewart river. These observations afford a rough section across the belt of crystalline schists mentioned by the Canadian geologists as stretching eastward and southeastward along the upper Pelly and adjoining streams and across to the Frances river. Along the eastern edge of the crystalline belt they also recognized rocks of a general greenish color, made up largely of altered volcanic rocks, which would answer to the description of the Rampart series. Similar rocks were also noted at various points on the Lewes above its junction with the Pelly, notably in the Seminow hills near the Big Salmon river, which may represent the development of the Rampart series on the south flanks of the crystalline belt.

Fossil Placers.—Intermediate between detrital materials of the present surface and original deposits in rock-in-place are conglomerate or cement beds, derived from older rocks, but subsequently hardened into a rock mass. These deposits, where gold-bearing, are generally known as fossil placers. The cement beds of the Black Hills of Wyoming and the "banket" reefs of the Transvaal are prominent types of such deposits.

Similar formations have been noted in the Yukon district, but more study must be given them before one can judge whether they are likely to prove of

great economic importance. Basal conglomerates derived from the wearing down of the older rocks occur in the Mission Creek and also in the Kenai series. On Napoleon creek, in the Forty-Mile district, a coarse basal conglomerate referred to the former series consists of materials derived from the Birch Creek, Forty-Mile and Rampart series. It dips steeply up the valley, and gravels of the stream that cuts across it are barren above and rich in placer gold below it, showing that the gold is derived from this bed.

Steeply dipping conglomerates, thought to belong to the Kenai and containing abundant pebbles of rolled quartz and other rocks, occur at the richest portion of the Koyukuk valley, about 300 miles above its mouth, and the gold there obtained is supposed to be derived in great measure from them.

Recent Placers.—Recent placer deposits may be divided into beach gravels and stream gravels, and the latter may be formed as deposits either from ancient or from modern streams.

Beach Gravels.—Auriferous sands have long been known to exist along the California coast, and are found to be quite extensively developed along the coast of Alaska, as has already been briefly indicated. So far as known, such placers have not yet been worked at a profit to any considerable extent, on account of their want of permanence. A sudden storm may so shift the sand bars in which the gold is found as to render futile a great part of the labor already done in preparing to work them. Fossil placers are in most cases beach deposits, for deposits of any considerable areal extent must necessarily have been spread out by ocean waters.

Ancient Stream Gravels.—The most notable instances of ancient stream beds that have been profitably worked are the old river beds on the western slope of the Sierras in California, where they have been preserved from modern erosion by being covered by flows of hard lava rocks. Similar lava flows are not uncommon in the interior of Alaska. They have been noted on St. Michael island and at Anvik, near the mouth of the Yukon; on the Yukon near the mouth of the Koyukuk, where they form bluffs 700 feet high; at various points on the Porcupine river; on Chicken and Napoleon creeks, in the upper part of Forty-Mile district; near the junction of the Pelly with the Lewes river, and for ten miles below; in Miles canyon, between Lake Marsh and Lake Lebarge; and on the Pelly near the mouth of the Hoole river. One instance only has been noted—in the Stikine valley, between Telegraph creek and the Tahltan river—where basalt has filled an old river channel and covered auriferous gravels in its bottom. In this case the bars of the present river, whose bed is for the most part cut below that of the ancient stream, were notably richer along the stretches where these ancient gravels were exposed. In none of the other localities were any underlying gravels observed, nor is it likely that in the interior region, especially in the more northern part, any such gravels, even if they exist, will be exposed, since, owing to the peculiar climatic conditions existing there, the modern rivers have not cut the deep valleys seen where the climate is warmer and the river gradient steeper, as in California. The lava flows noted above are all supposed to be of pre-Glacial age, and are basaltic, thus differing from the recent volcanic rocks along the Alaska peninsula and the Aleutian islands, which are mostly andesitic.

Silts.—One of the most striking features of stream deposits in the Yukon district is the great accumulation of fine silts in the broader reaches of the valleys. The greatest of these is the Yukon Flats, an area nearly 100 by 200 miles in extent, through which the Yukon river meanders for about 250 miles, from Circle City to Fort Hamlin, and which stretches forty miles up the Porcupine, where it is estimated to be ninety miles wide in places. In this flat region the Yukon river spreads out to a width of many miles, filling numerous channels, with an archipelago of broad, low islands of silt between them. The main stream generally follows the right bank, which it is rapidly cutting down, and is thus moving its bed gradually to the northward. On the southwest the flat extends to Birch creek, which below Circle City also meanders in it. Its general level is hardly more than 30 or 40 feet above the river at low stages, but other portions are higher and evidently above the level of overflow in the present condition of the river. Similar flats, but of more moderate dimensions, occur along the Yukon between Fort Hamlin and Mynook creek, at the mouth of the Tanana and for some distance up the valley of the latter stream, for 35 miles above the mouth of the Koyukuk river, and at various points below this river down to the Yukon delta. These silts contain abundant driftwood, and sometimes standing trees buried in place; also shells of living species; and in silt deposits above the conglomerates of the Palisades, 35 miles below the mouth of the Tanana, parts of the skeletons of mammoths and other animals have been found mixed with driftwood. The silts are also found in the lake valleys and broader river valleys of the upper tributaries of the Yukon, even within the region of glaciation. Here they are above the still or boulder-clay, which is the characteristic base deposit in a glaciated country, and are hence assumed to have originated since the retreat of the continental glacier and to be made up largely of the fine rock material ground up by that glacier. The fineness of their material suggests that they must have been deposited in quiet water, either lakes or very sluggishly moving streams; the more rapidly carrying away, except on the Yukon delta. In such deposits the gold that is brought down would be in the finest state of division and so generally disseminated as not to be likely to from workable placers. The stream gravels in the upper Yukon are found to be more recent than these silts, and rest upon them.

(To be Continued.)

The Use of Oregon Pine in Mining Operations.

The first step in the evolution of improved methods in mining, says G. A. Buell in the Mining Resources of Calaveras County, was the rocker; then followed the sluice-box, the material for both being whipsawed at great expense from timber adjoining the claim. These being used on the surface of the ground and having no weight to sustain, excepting their own, generally lasted as long as the claim paid. After the surface diggings were exhausted, miners naturally turned to gold-bearing quartz veins as a field promising great returns for the amount invested. In the pursuance of this theory, the shafts were timbered and lagged with hewn and sawed timbers cut from trees in the immediate vicinity, these trees in the majority of cases being the *Pinus ponderosa*, commonly known as bull pine. The mines being located in the heart of the Sierra Nevada mountains, with no method of communication with the valley and coast country save by wagon, the thought very naturally never occurred to the operators to ascertain if there was any other timber more suitable for the purpose, having more strength, more life, and, in fact, more durability in every way.

In the majority of cases they found the vein growing richer as the mine became deeper, and as a consequence the timbering at the head of the shaft, supposedly put in place temporarily, was found too light or else decayed in from one to two years, necessitating retimbering at a great expense. For stoping and tunnels, round timbers were used and are in use at the present time, although their life is of short duration, and in loose, shaley or schistose rocks at any great depth they have to be very massive and set close together in order to carry their load. A round timber, even though a small one, is a slippery and awkward thing to handle, and when one is from 20 to 24 inches in diameter the difficulty of handling is correspondingly greater.

Quite a number of mining companies are still using these old-time methods from the probable reason that the value of the Douglas spruce or *Pseudotsuga Douglasii*, commonly known as Oregon pine, has never been presented to their notice in such a manner as to sufficiently impress them with the economy of using it for their permanent work.

The purpose of this article is to demonstrate the superior quality of Oregon pine over any other available timber on the Pacific coast or elsewhere for permanent use in mining operations.

ABSTRACT OF THE RESULTS OF TESTS UPON BULL PINE (*Pinus ponderosa*) AND UPON OREGON PINE (DOUGLAS SPRUCE OR *Pseudotsuga Douglasii*.—Made by the University of California.

	Expts.	Average Results. Lbs. to sq. in.
1—Modulus of Strength at Elastic Limit.		
a. Bull Pine, seasoned log and sawed timber	3	4,500
b. Bull Pine, green log	1	4,000
c. Oregon Pine	4	7,750
2—Modulus of Strength at Rupture.		
a. Bull Pine, seasoned log and sawed timber	3	5,460
b. Bull Pine, green log	1	4,580
c. Oregon Pine	4	10,130
3—Modulus of Elasticity.		
a. Bull Pine, seasoned log and sawed timber	3	1,194,200
b. Bull Pine, green log	1	836,300
c. Oregon Pine	4	2,449,200
4—Percentage of Moisture.		Per cent.
a. Bull Pine, seasoned log and sawed timber	3	23.28
b. Bull Pine, green log	1	69.60
c. Oregon Pine	4	25.03
5—Weight Per Cubic Foot.		Pounds.
a. Bull Pine, seasoned log and sawed timber	3	31.00
b. Bull Pine, green log	1	45.80
c. Oregon Pine	4	40.71
II—TENSION TESTS.		Lbs. to sq. in.
a. Bull Pine, seasoned log	8	5,332
b. Bull Pine, green log	6	9,083
c. Oregon Pine	5	17,049
III—CRUSHING ENDWISE TESTS.		
a. Bull Pine, seasoned log	11	3,335
b Bull Pine, green log	5	2,243
c. Oregon Pine	8	5,849
IV—CRUSHING ACROSS THE GRAIN TESTS.		
1—Crushing 3 Per Cent of the Height.		
a. Bull Pine, seasoned log	12	598
b. Bull Pine, green log	10	356
c. Oregon Pine	8	741
2—Crushing 15 Per Cent of the Height.		
a. Bull Pine, seasoned log	12	808
b. Bull Pine, green log	10	524
c. Oregon Pine	8	1,048
V—LONGITUDINAL SHEAR.		
a. Bull Pine, seasoned log	20	327
b. Bull Pine, green log	21	375
c. Oregon Pine	16	574

By carefully examining this table it will be seen that the Oregon pine will stand, in most cases, double the load of the bull pine, which in turn demonstrates that additional cost for the Oregon pine would be more than made up by the decreased size of timber required to stand a certain strain, and, as an illustration of this, prominent mining men are now using 14x14 sawed Oregon pine timbers where they formerly used round timbers of bull pine 22 and 24 inches in diameter.

Among the first to use Oregon pine for their operations was the Gwin Mining and Development Company of Calaveras county, who sunk a three-compartment shaft 1300 feet before they attempted to take out any ore for milling purposes. Others followed in rapid succession, and it is safe to say that the majority of the leading mining companies in Mariposa, Tuolumne, Calaveras and Amador counties use no other timber in their mining operations.

Up to two or three years ago there was a reasonable excuse and argument against the use of Oregon pine, on account of the great cost of freighting it from terminal railroad points in the valley to the mines. This obstacle has now been done away with, as lumber companies with vast holdings have established distributing points at the terminals of all mountain railroads and can on short notice supply any size timber up to a mortar block, at a very slight advance in price over the mountain or bull pine.

The idea of this article is to bring to the notice of mining men the economic advantages of the use of Oregon pine which will stand the closest scrutiny and the hardest tests, and one trial will convince the user thereof of its superior value over any other known timber for mining operations.

The grade of Oregon pine best suited for mining purposes is known to the trade as merchantable or No. 1 building lumber, and does not require the service of a lumber expert to determine whether or no a timber is of standard grade and suitable for a certain purpose.

Admitting the lasting quality of the material, the next question to answer is, What constitutes merchantable Oregon pine? Coarse grain or wide spaces showing between the annual rings is not proof positive that a timber is lacking in strength unless, as sometimes happens, the growth between the rings is of a spongy nature, lacking fiber and easily picked out. When Oregon pine timbers 8x6 and up have been exposed to the action of the weather for any considerable length of time they become what is termed "season-checked." This does not impair the strength when the checks are parallel with the grain; where the check cuts across the vein, it is in reality a feature produced when the tree was felled, and the timber would be no stronger than the weakest point, which would be that portion not touched by the fracture. Pitch seams affect the strength of a timber in the same manner as the "season checks," and where they are not very long and run parallel with the grain they do not in any way affect the strength. Tight knots are allowable in this grade, and small loose knots when they do not materially affect the strength of the timber. Large loose or rotten knots or fractures which materially impair the strength should condemn a timber at once, and it should not be used under any circumstances. It does not matter what size trees the lumber is cut from, or, in other words, whether the grain of the timber or plank is slash or vertical, as long as the grain shows the length of the piece. Cross grain, or grain that shows both ends running out of the piece oppositely, even at intervals of 6 inches, is not desirable and could not be used for any purpose excepting lagging.

Mining companies who are constantly extending their works should keep at least six months' supply of lumber on hand, and when same is to be exposed to the weather for any considerable period it is advisable to stick same, allowing a free circulation of air, and the ends should be painted, which will, to a great extent, prevent checking. Where timbers are constantly exposed to dripping water or clouds of steam, it is advisable to dip same either in coal tar or a composition of which asphaltum is the main ingredient. By so doing the pores are closed so that no moisture of any kind can enter the wood. This is only necessary in extreme cases, as under ordinary circumstances timber will last the lifetime of a mine. It is, however, advisable to heed the ancient proverb, "An ounce of prevention is worth a pound of cure," and a brick or stone furnace with an iron vat and derrick to be used for dipping purposes could be erected at a very small expense, and it would permanently insure material thus treated from decay, as Oregon pine has never been known to decay or dry rot from the interior of the timber.

The chemical treatment of structural timber has been described by Mr. John D. Isaacs of the Southern Pacific Company, and will be found in a pamphlet written by him and published by the State Mineralogist in the thirteenth report, 1896.

CONGRESS has acted favorably on a prepared amendment to the sundry civil bill extending for one year the time when the surveys for forest reservations may be had. This continues the law as at present, and suspends for another year the latest order of President Cleveland making several large reservations.

Concerning Certain Physical Theories.

NUMBER III.

The nebular hypothesis, now advanced to a theory, supposes that the matter of the solar system was originally an intensely heated gas, extending as far as the orbit of the outermost planet, Neptune, and this gas cooled and contracted, thereby increasing in rotary velocity and throwing off successive rings, which condensed into the planets. The proximity of the orbital planes of the planets, and their spacing, point to some common origin, but the idea of a heated original gas has insuperable difficulties, of which the chief is the enormous and unnecessary waste of heat energy. This seems certainly sufficient to have kept a million solar systems comfortably warm during eternity. It is contrary to reason and to nature, as we know, to create all this heat simply to throw it away again *unused*. It served no useful purpose at all. It was imagined simply in order to get matter out to the verge of the solar system, and thrown away in order to get that matter, or most of it, back again. This matter would, if cold, become heated as it fell to a center, but, by the theory, it already had all the heat it could reasonably, or possibly, hold. To heat matter and then cool it, then let it fall together and reheat itself and finally cool it again, to get a habitable earth, is most certainly clumsy. This double heating and double cooling is especially to be noted. The pencil of the boldest may well hesitate to compute the energy thus lightly created and tossed aside.

If we accept this theory, several questions present themselves. Gases diffuse in all directions. To throw off a ring rotational velocity must be great enough to overcome attraction of central mass, and the same condition would exist inside the ring. Hence these gases, thus freed from constraint, would spread themselves, instead of condensing. Hence no tendency to condense into a globe is apparent. It is held that rings must have thick spots in order to form planets. Rings of solid matter might have such denser parts, but the nature of gases is to interdiffuse and equalize. The planets are not in the same planet as they ought to be if formed from a homogeneous gaseous body. A solid central mass seems to be indicated because such, either contracting or growing from outside addition, might well alter its axis. To throw off rings a rotating mass must be very oblate and must so continue till slowed by tides or other force. If the sun were ever oblate enough to throw off rings or planets, it ought to be still quite as oblate; and in the practical absence of tides, ought to rotate about twenty-five times as fast as it really does. On the tidal evolution theory, it is claimed to have been mathematically demonstrated that the moon must have been thrown off from the earth at about the time the latter was rotating in two to three hours, the rupture itself being caused, it is thought, by vibrations set up by solar tides, the possibility whereof is very doubtful. Since that rupture the earth and moon have slowed the axial rotation of each other by tides, and slowly separated. The same reasoning would apply to all planets having liquid. Hence it is not apparent how the second and subsequent moons of Jupiter or Saturn could have been thrown off, as solar tides would begin to slow rotation the instant any liquid matter formed. Neither is it clear how the solar force could cause a rupture, yet at the same time, or previously, slow the rotation and prevent a rupture. If two hours be the rupturing period, the rupture could not have occurred later, if rotation were growing slower. The prior rotation could not have been faster, on pain of rupture, nor equal nor slower if any liquid were on the globe, for the speed would have decreased, not increased. Thus either a gaseous or solid state required. A gas must become liquid before it can solidify. Hence it is difficult to see how the supposed rupture could occur. The idea that the moon was thrown bodily from one spot of earth is not tenable. The other side of earth would do the same unless explosion or other force be called in; but if solid particles were thrown off all around the equator, these would condense into a mass on account of the resistance of earth's atmosphere. If satellites were thrown off by any of the alleged processes, how did it happen that such giants as Jupiter and Saturn have moons so small, with two exceptions, smaller than our moon? Either a ring theory or a rupture theory would seem to involve satellites somewhat in proportion to their primaries. If our moon were thrown off from the earth when rotating in two hours, it would have a velocity of 12,500 miles per hour; if in one and one-half hours, say 18,000 miles. The present speed is only 2273 miles per hour. What became of the lost speed?

The formation of a thin crust on the surface of a cooling molten globe does not seem possible. Such crust would sink, though only to a point where pressure would render the liquid equally dense, there to melt. This process would in time make a thick crust. But that crust would be heaved and tossed by daily tides in the molten matter below. Volcanic lava is thought to come from the earth's melted interior. The above shows that the crust must be far too thick for any such thing; and the thickness of stratified rocks indicates the same.

Paleozoic rock of twenty miles thickness, other strata of five and ten miles, are supposed to be the debris of washed-down continents, deposited at sea bottom, then raised and washed down again. If half the original deposit was washed away subsequently and twenty miles was left, it must have been forty miles thick. If the ocean occupied half the surface of the earth, the land surface must have averaged eighty miles elevation. There seems to be a hiatus in the usual explanation.

A rotating mass of gas about to throw off a ring would be very oblate, with thin edge. If cooling, that cool edge would cool faster than interior, and hence its rotation increase faster than interior, and go ahead of it, instead of the reverse. If a ring were thrown off it would expose still more surface and hence cool still faster and return to the parent mass. If rotatory speed be desired merely from contraction, an atom or a world nearing the center would increase its angular velocity, but not its actual. The actual speed of Neptune is about 12,000 miles per hour; Uranus, 15,000; the earth, 66,000. Where does this increase come from? The rings of Saturn rotate in about the same time as Saturn, but are only about 100 miles thick, while 28,000 wide. Is such a form and speed consistent with any theory of a thrown-off gaseous ring? These rings were once pointed to as strongly confirming the nebular hypothesis; but they increase the difficulties. If the sun be as hot as some suppose—millions of degrees—it cannot have cooled to any appreciable extent (the cooling being from the outside of the great original mass, and certainly such heat would be all that the hottest theory ought to call for), and hence ought to be still rotating at about its original speed, say once in 165 years, as Neptune; but it turns in twenty-five days. Or if it be held that it has really cooled in proportion to its speed, and its present temperature be, as some estimate, 28,000,000 degrees, that multiplied by $\frac{365 \times 165}{25}$ would indicate considerable original warmth. It is very doubtful if any rotating gas spheroid could cool and contract and at the same time throw off rings. If it cooled at edge, that edge would rotate faster than interior, contrary to observed motion of sun and planets. There could be no way of cooling the center faster than the edge. If it cooled equally all through, it would not only be contrary to the action of all known cooling bodies, but it would require an intense internal circulation to convey heat outwardly; and it is not quite plain just how or why a portion of matter previously traveling from rim to center, could decide to become independent and go off by itself as a ring. Or if it did, what would hold it quiescent while the main mass could have time to shrink away from it.

If we totally reject, as we should, any theory looking to a heated gaseous origin to the solar system, what then? Certainly that such origin was from matter both cold and solid. We may conceive of such as a handful of dust thrown into space and endowed with two motions, onward and gyratory, or two colliding portions of matter, developing rotary motion, but in all cases two motions and matter more or less finely divided—cosmic dust. Such matter would inevitably coalesce into larger and larger masses. While small, such masses would be cold; as they grew larger the attraction of gravitation would increase the impact, and they would grow warmer and warmer, perhaps even to a molten condition on the surface. As the amount of such matter and condition of meeting may vary infinitely, so with results. For instance, if a cold globe overtook, or was overtaken by, other matter, the collision might be extremely gentle; if head to head collision, mild or great heat, according to mass. If periods of these two kinds of collisions alternate, or are succeeded by periods of no collision, there might ensue great variations of heat and cold, as seems to have been the case on earth. Possibly the great upheavals shown in geologic rocks may have resulted from collisions of large masses.

Nebulæ often show spiral, or disc, forms. If necessary to imagine the planets as formed from rings, it is immensely more reasonable to suppose those rings co-existing and formed of cold solid matter around a center rapidly rotating, as might result from a glancing collision. Those rings would form planets with similar cold centers, concerning which it should be noted that matter so building would form concentric arches, taking up the increasing pressure, and hence that the pressure at center of earth would be much less than usually supposed, and thus fully explain the density of earth. The pressure at center of earth, if built in any other way than above suggested, would be so great, 25,000 tons per square inch, that mean density of earth would be more than it is, and it has been unusual to endeavor to account for the difference by assuming heat as an expanding agent.

Moreover such coeval and coexisting rings would explain a fact which other theories fail to do. The outer four planets are very large and of small density. The inner four are small and of high density. The supposed rings might easily be of different material and different thickness. Being solid, they need not be homogeneous, as gas must be, and as matter originating from a common central mass must be. Also, such origin would allow, as gas theory does not, for the variation in the planes of revolution of the planets. Slight differences in density would fully explain such variation.

If, as maintained in a previous paper, heat does not radiate into space, and if, as the rocks and volcanoes of earth show, great heat has at one time prevailed at the surface of the earth, now cool, it is a proper question, what became of that heat? It went inwardly; was absorbed by the cold interior. This becomes more easy to understand if we remember that the earth is covered with a blanket, the air, to prevent outward radiation, and also that the interior is probably mostly iron, one of the best conductors of heat. About four-fifths of the meteorites met by the earth are of iron. The thickness of the sedimentary rocks thus would be partly due to the growth of the earth by outside additions—a fact that every meteor demonstrates. Some astronomers estimate that the earth captures daily about 3,000,000 particles of loose interplanetary matter. The earth, in its travels through space, may encounter at times clouds of such flying matter of more or less thickness.

In the above I present only the skeleton of a few arguments that seem to me to discredit a theoretical origin of the solar system other than from cold and solid matter.

W. S. PROSSER, Civil Engineer.

Auburn, Cal.

Recent Additions to the Collections of the California State Mining Bureau.

Coal of very fair quality, said to be used for blacksmithing; Rogue River, Curry county, Oregon; R. D. Hume. Five specimens of gold quartz from Coffee creek district, Trinity county, Cal.; W. R. Conant. Rich copper ore from Union creek, Trinity county, Cal.; Geo. Madeira. Sapphires, of a rich blue color, from near Utica, Fergus county, Montana; Jacob Hoover. Gold quartz from New Year mine, Soulsbyville, Tuolumne county, Cal.; Blodgett, Miller & Muller. Gold quartz, showing free gold, from Boulder mine, Trinity county, Cal.; G. S. Carr. Gold quartz, showing free gold, from Inauguration mine, Randsburg, Kern county, Cal.; L. L. French. Corellite (sulphide of copper), fine crystallized specimen, from Rio Grande county, Colo.; M. Bixby. Fine jade adzes and eight specimens of various minerals from New Caledonia; Dr. Jno. Rabe. Gold quartz, high grade, from Eagle mine, Eagleville, Churchill county, Nevada; Geo. A. Trimble. Thaumasite, a very rare mineral, from West Paterson, New Jersey; M. Bixby. Native copper from Old Dominion mine, Globe district, Pinal county, Arizona; Mrs. Tremble. Vanadate of copper from Mammoth copper mine, Glenn county, Cal.; E. W. L'Hame; first occurrence of this mineral noted in California. Gold quartz from Virginia Dale mine, San Bernardino county, Cal.; D. Balch. Turquoise from a new find between Goff's mining district, San Bernardino county, and Death Valley; Mrs. J. Young. Gold quartz from Chileno mine, Mariposa county, Cal.; J. W. Woodside. Gold quartz from the 220-foot level of the Alaska-Mexican mine, Douglas island, Alaska; R. A. Barclay. Gold on dolomite from a shaft 100 feet deep on section seven of the Mariposa grant, Mariposa county, Cal.; and ilmenite in dolomite from the same locality; John D. Ludwig. Gold quartz, ranging in value from $60 to $300 per ton, from Kellogg Creek mine, Plumas county, Cal.; F. Von Liecht. Gold quartz from Mayflower mine, Greenhorn district, Kern county, Cala.; J. M. Waugaman. Copper ore from Cholame district, Monterey county, Cal.; Frank M. Stone. Rich copper ore, cuprite and native copper, from South Fork of Salmon river, Trinity county, Cal.; R. D. Lawrence. Calcareous hornblendic rock, with limonite, hematite, pyrite and gold, from Mendocino county, Cal.; Dr. Geo. W. Stout. Silver ore with gold from Kwang Hsi province, southern China, value stated to be $100 per ton, of which $40 is gold; W. N. Fong. And sundry other specimens.

HENRY S. DURDEN, Curator.

A Colorado Compliment.

About 1100 newspapers and periodicals are weekly received in this office, and if one one-hundredth of all the kind things said therein about the MINING AND SCIENTIFIC PRESS was reproduced herein there wouldn't be room for anything else. The following is from the Silverton, Colo., *Standard*. Reproducing a few lines of illustrated comment, the *Standard* says:

The above is from the MINING AND SCIENTIFIC PRESS of San Francisco of Feb. 26. The MINING AND SCIENTIFIC PRESS is the greatest and most widely circulated of any mining paper extant, and the engraving and notice of the mineral resources of San Juan county was most assuredly a high compliment to both county and paper. As an advertisement it can not be overestimated. The MINING AND SCIENTIFIC PRESS reaches thousands of solid mining men and capitalists, who are invariably on the lookout for legitimate fields of investment. That paper does not cater to bogus mining schemes nor idle curiosity hunters, and is what it claims to be, a straight up-and-up mining and scientific journal. The good work done for our county through that journal cannot be overestimated. The MINING AND SCIENTIFIC PRESS merits a big subscription list in this town.

How Armor is Made.

The first process is that of casting the ingot. This is done by the molten metal being poured into a mold placed in the casting pit at one end of the melting house. The ingot is then first taken to the press house and placed in a reheating furnace to be got to the required heat for slabbing. The ingot is carried by means of a porter bar, having attached to it counterbalance weights. The largest ingots of seventy tons weight require eighteen to twenty-four hours for reheating. When hot enough, the ingot and porter bar are lifted by one of the 150-ton cranes and placed under the hydraulic press, which works at 8,000 tons. Here it is pressed or slabbed down to the required thickness. It is then taken to the mill and charged into another furnace, this time in a car furnace, and heated to the necessary heat and rolled to the proper thickness, the area rolled in most cases being about ten feet wide and twenty-six feet to twenty-eight feet long—sizes which of themselves carry some suggestion to the mind as to the heavy plant involved. The 8,000-ton hydraulic press used for reducing the immense ingots to a size suitable for the rolling mill is a magnificent tool, weighing in all 783 tons. It consists of two hydraulic cylinders forty inches in diameter having a stroke of ten feet; the body of each cylinder, of cast steel, is nine and three-fourths inches thick, and is supported by cast steel girders, carried in turn on four forged steel columns, which are secured at the bottom ends to the cast steel base plate, on which also the anvil rests. The gliders have a boss at each end, through which the columns pass, being screwed at the end and secured by coned bushes and screwed nuts. In connection with this press there are seven reheating furnaces with the necessary gas producers, and here it may be interesting to add that an ingot four feet three inches thick is squeezed in the press down to fourteen inches in thickness in about one hour, if for a finished plate, the plate being cogged in one heat. In the process the area for a finished plate is increased from nine feet by six feet long, to nine feet three inches by twenty-one feet long. For a slabbed plate for rolling the area is about eleven feet by twenty-seven and three-fourths inches thick; the slab is then passed to the rolling mill if the finished thickness is less than twelve inches, and the greatest area that can be rolled is twelve feet wide. Plates over twelve inches thick, however, pass direct to the planing shop, where they are machined accurately to finished thicknesses.

MANY amateur photographers fail owing to the ignoring of a few simple rules. An authority says that the beginner should buy a light stand, fill his magazine or slides with ordinary plates and practice time exposures on all sorts of still objects till he can turn out a good negative with a fair degree of certainty, and has mastered the elements of development. With the perfect plates and pure chemicals available nowadays, this should soon be accomplished. Snap-shooting may then be taken up. A stand should be used, as the vibrations of the human body are most mischievous in their effect on the plate. The plates should be only fairly rapid, as the very fast plates mean fog and disappointment to the beginner. If the operator would avoid pinholes, he must be jealously on his guard against dust. The camera should be frequently dusted out, and the inside smeared with thin vaseline, which collects and holds a large quantity of the dust caused by the powder of abraded glass chips and other causes. A golden rule is not to snap at random. Never expose a plate on a subject that will not, when developed and printed, be a credit to the album. For a resting place, if no better is at hand, use one knee, going down on the other to secure additional steadiness. Many photographers put the camera under the arm and press it to the side. The beginner will soon find which way suits him best. There is no hard and fast rule about exposures, but the following periods are recommended for general purposes: Wave studies, waterfalls and rapid rivers, one-fifth to one-tenth second; street studies, with no fast-moving horses or cycles within fifty yards, one-twentieth to one-thirtieth second; slow-sailing vessels or quick steamers, end on, about one-twentieth to one-thirtieth second; ordinary work and athletic sports, one-fiftieth to one-eightieth second; rapid finishes, one-one hundred and twentieth second, or over. Above all avoid the besetting sin of beginners, which is to set the shutter at too high a speed. Number every hand camera plate, entering full details of exposure, subject, light, etc., in a notebook against corresponding number.

PERCHOID is a new product, and a substitute for gutta percha, the supply of which has of late shown such disquieting signs of collapse. Perchoid, the invention of Dr. Napier Ford, is oil which has undergone a high degree of oxidation. Dr. Ford experimented for many years to produce a method whereby oil could be fully oxidized, and at last he succeeded. The result is perchoid. The oil is heated with litharge, stirred long and continuously, and then allowed to cool. Specially prepared tow is then dipped in it, and, placed in wire baskets, subjected to currents of air. The oil adhering to the filaments of the hemp becomes wholly oxidized. Under the microscope the hempen threads appear sheathed with a coating of amber. This is done through rollers and comes out as a leathery material, closely allied to, if not identical with, rubber. Its tenacity is increased by mixing it with sulphur. It can be rolled as thin as a piece of tissue paper and any fabric, and it makes leather impervious to moisture, though not to air. It is said to be eight times cheaper than rubber and more durable. One of its great fields will probably be the making of pneumatic tires. It is stated that a chemical manufacturer in London, whose hydrochloric acid tank used to be lined with gutta percha at a cost of $50, had a lining made of perchoid for $1 50, which serves just as well. Perchoid should be a godsend to the electrician, as it never becomes brittle, and never leaves the wire, two most valuable qualities in an insulator.

A COLD chisel for heavy chipping should be sharpened slightly oval or rounding. A tool sharpened thus will stand harder usage than when the cutting edge is concave, or even straight. The reason for this is based upon the strength of the arch. The engineer builds a dam across a stream in the shape of a curve for the same reason, and both the engineer and the beaver, in his native stream, obeys the same law in regard to this matter. Aside from the principle of the arch, there is less danger of breaking the corners off of a chisel when the edge is curved, for then the force of the blow is supported in a brace-like manner by the metal in the curved corners, whereas in the concave point the same bracing action, applied in the opposite direction, tends to split off the corners of the tool. The matter is so simple that every machinist should take advantage of it to add strength and durability to his tools. The same shape can be given to screwdrivers when they are to be used in chucks on work like that of putting screws into shoemakers' lasts. Thousands of screws are thus put in, and it is found that if the end of the screwdriver is rounded off the least possible amount it is much easier to make the tool bit engage the slot in the screw. When the bit is the least amount concave on the end, it is impossible to make the screwdriver take hold when running even at a low working speed. Make the end of the tool convex one-thirty-second of an inch, and the speed at which the tool can be put into a screw slot will be doubled.

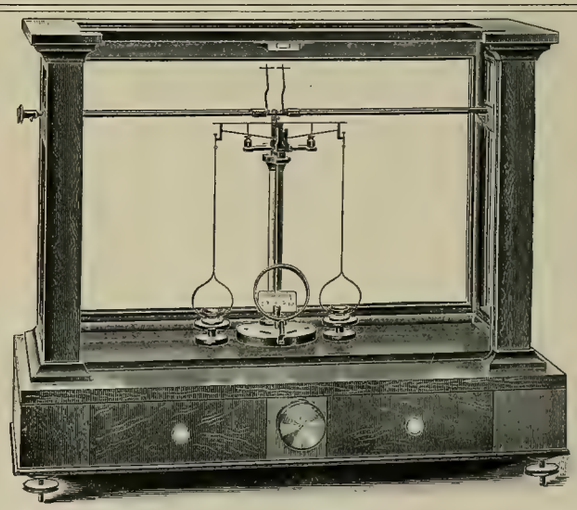
ATTENTION is drawn by Moissan to the fact that calcium carbide is a powerful reducing agent, and hence, when in a fused condition at a high temperature, can furnish, by double decomposition, a number of new compounds. When acting on metallic oxides, the metal may be obtained in a free state, or, if it is capable of uniting with carbon, a carbide is formed. By this reaction Moissan has prepared crystallized carbides of aluminum, manganese, chromium, molybdenum, silicon, etc.

THE earliest miners and metal workers of whom we have record were the Aryan peoples of Euro-Asian origin, who, though of pastoral and arboreal habits, were familiar with the metals and worked with them—at least with the metals gold, silver and bronze. Chaldeans and Assyrians, as we now know from the cunei-form inscriptions which go back 3000 B. C., were undoubtedly expert in the use of metals, while the Egyptians had an intimate knowledge of the arts and sciences. In the brick and other inscriptions recently discovered, artisans are seen at work with curious details of their methods and tools. Potters, indeed, had attained eminence in their art, and the Egyptians had certainly a knowledge of chemistry, as the samples of their glass blowing and the stone pictures of tools, forceps, blowpipes, etc., prove. Gold was largely used at an early period—between 4000 and 5000 B. C., as we find from some newly discovered and ingenious weighing balances. Many centuries older than the pyramids, which date from fifty to sixty centuries back, we have examples of engineering in Memphis which could not have been constructed without tools and necessarily an acquaintance with metals. The word "metals" is of Semitic origin—the Hebrew word "metals," to forge, indicates an early acquaintance with the fusing of ores and the malleability of metals. How these early primitive people discovered the use of things must, of course, have been through their needs, particularly after they left pastoral and tent life and began to build cities. The Arabs are credited with being early acquainted with the alloys, though alchemy, as a science, dates only from the sixteenth century.

THE *Railway Age* of the 18th ult. has an interesting article on the Correspondence Schools car. This enterprise is a new departure of the management of the International Correspondence Schools of Scranton, Pa. It is intended to direct public attention to the work of the schools and goes on a tour through the principal manufacturing cities of the country. The outer construction of the car is similar to that of all modern passenger railway cars. The interior is divided into compartments; the reception room (fitted as a library), sleeping sections, a storage room for clothing, books and supplies, with the customary conveniences, including hot and cold water, etc. The president of the School, Mr. R. J. Foster, is in charge of the car, with an assistant, Mr. John G. Forsyth, and six representatives of the School. The plan is to locate the car for a time in the immediate vicinity of large manufacturing establishments, to give those interested a practical demonstration of the method in which the work of the Schools is carried on. The scope of these Correspondence Schools embraces instruction by correspondence in civil, mechanical, electrical, hydraulic, locomotive and railroad engineering, mechanical drawing and the ordinary English branches. This institution is now in its seventh year. Its operation requires the employment of over 400 different persons. It is possible that the itinerary of the car will be extended to the Pacific coast.

WITH the recent passage of an ordinance bill by the City Council of Kenosha, Wis., the last link in the most extensive interurban electric railroad line in America was welded. Within a few months it will be possible for a trolley car to travel uninterruptedly from Chicago to Green Bay, Wis., a distance of 201 miles. The electric line parallels the Milwaukee division of the Chicago & Northwestern Railroad. The Milwaukee, Racine & Kenosha Co. is now operating nine cars, one every hour, between Milwaukee and Kenosha. It charges half the fare charged by the Chicago & Northwestern, but the service is much slower.

THOS. A. EDISON writes: "I wish to protest against many articles appearing in the sensational newspapers from time to time purporting to be interviews with me about wonderful inventions and discoveries made or to be made by myself. Scarcely a single one is authentic, and the statements purporting to be made by me are the inventions of the reporter. The public are led from these articles to draw conclusions just the opposite of fact. I have never made it a practice to work on any line not purely practical and useful."



A New Short Beam Assay Balance.

To meet the constantly increasing demand for more accurate and rapid assay balances, Wm. Ainsworth of Denver, Colo., is now making a balance, shown in the accompanying illustration, which has so far proven equal to the most exacting conditions and severe service.

The balance is sensible to 1-200 milligramme and, at this increased sensibility, weighings can be made in from one-half to one-fourth the time of those made on any long beam balance. It can also be adjusted to weigh to 1-400 milligramme when extreme accuracy is alone sought for.

In making a balance of this accuracy it is evident that too much care cannot be taken in adjusting and dividing the beam, and, therefore, the construction of the beam of this balance has necessitated the construction and use of improved and accurate machinery and test instruments.

For adjusting the beam to equilibrium there is placed upon the center edge, back of the beam, a star wheel on a finely threaded arbor; by moving the wheel backward or forward, it moves along the arbor and thus makes this adjustment. The position of this adjusting device, back of the beam, allows the rider to be used over the center of the beam.

The new skeleton hanger used on this balance has been designed with a view to making it as light as possible and still maintain the required strength. It also has the advantage to be gained of having a single point of contact with the pan rest, which greatly eliminates its liability of sticking to the pan rest when dirty and causing the beam to throw to one side or the other. The counterpoised sliding door has been removed to better illustrate the working parts of the balance.

A catalogue fully describing this and other balances manufactured by Wm. Ainsworth can be had upon application.

Mining Summary.

CALIFORNIA.

Amador.

On the Benoist ranch a tunnel is being run and a 10-stamp mill is nearing completion.

The Union Con., at Wieland, is running thirty stamps on ore from the 400 and 500 levels.

Supt. Ross will remove the machinery from Pioneer to the Ironbound mine. When this work is completed sinking will be resumed. The present developments on this property are quite satisfactory.

The tunnel on the Imperial is in over 40 feet and is being pushed in vein matter from 60 to 70 feet wide and 100 feet in depth from surface that prospects favorably. The owners will erect a mill after some further development work. The property is on the King ranch, near the Ballot mine. W. H. Chestnutwood of Stockton is principal owner.

Developments at the Central Eureka are progressing. The shaft is being sunk from the 900 at the rate of 5 feet in twenty-four hours. A drift was started to the north on the 900 last week. On the 600 level they are drifting in a fine body of ore. A crosscut run into the ore body 25 feet at this point did not penetrate the footwall.

In the Central Eureka on the 600-foot level a good body of ore was discovered.

The Robinson mill is running on ore from the Iron Mass mine. They have put in a concentrator and blanket plant and will give it a thorough test before determining to put up a mill on their own property.

Ledger: The Zeila mill is running as usual and about the usual number of men are kept busy in the mine. The Zeila has not made a sufficient profit above running expenses for the past year to declare a dividend, but operations are continued in the hope that better values may be encountered.

Dispatch: The Anita is bulkheading the drift at the 500-foot level to stop the flow of water into the shaft, after which sinking will be resumed.

Butte.

E. Brooks of Enterprise sold to Avery & Murray the Bright Star and Little Monarch claims. A year ago Murray Bros. purchased the Crystal Peak, at Enterprise, and replaced the 4-stamp mill with a 10-stamp, which is in constant operation.

Calaveras.

Five men are at work on the Murphy mine, near Murphy's, and are meeting with success. J. D. McDonald is taking out good rock near the Buckhorn.

The Champion mine, at West Point, has resumed operations. Gibson & Manley are taking out good ore.

Beauchemin & Co. are running night and day at their mine on Valentine hill.

The Angels *Echo* says that one-half a ton of rock taken from the Collier mine, six miles from Murphy's, was sold to the Utica Co. for $300.

Echo: Mr. Baumhogger, owner of the Great Western mine, near Mokelumne Hill, will add five stamps to his mill. The ore is getting richer as developments are made and the vein increases in width with depth. The last clean-up was very good.

The shaft in the Esperanza mine at Mokelumne Hill has reached a depth of 900 feet. The *Prospect* says that while sinking an improved class of ore was discovered. The ledge is about 70 feet in width. It is said that thirty stamps will be started about April 1st.

A strike is reported in the Hedrick gravel mine, near San Andreas.

At the Mayday mine, near Murphys, the tunnel is progressing rapidly. Two shifts are on night and day and the power drills keep up their work. The series of mines which will be opened by this tunnel can each be operated through the tunnel, and the ores brought to Murphys creek, where it is expected a mill will be built.

The Round Butte placer mine has been reopened, and is awaiting water supply to begin washing gravel.

Del Norte.

W. Kemp is expending money on claims located by himself and for others in the Low divide.

El Dorado.

(Special Correspondence).—The Church M. Co., which resumed work recently on its property, is making good progress. A new shaft is going down near the east line of the mine, and a tunnel is being driven near the mill. The Church mine was a dividend payer from its outset and so continued for nine years in a good grade of ore. One year ago a new shaft was started and the ore was deemed too low grade for profitable working in a 10-stamp mill, and in the dilemma of erecting a larger plant or closing, the latter plan was adopted as a temporary measure.

Placerville, March 22nd, '98.

(Special Correspondence).—There are three slate quarries in El Dorado county which were worked from 1888 to 1895, and have produced annually about 5000 squares of roofing slate. They are the Chili Bar quarry, containing forty acres; the Kelsy quarry, containing forty acres on the slate belt, and the San Francisco slate quarry, containing 310 acres, all slate land. The slate belt is over 1000 feet in width and two miles in length, with a height of 1500 feet from the river. These properties are within four miles of Placerville.

The quarries are opened with faces of a width of several hundred feet. The quality is equal to the best European and Eastern slate; it has been proved theoretically and practically. The slate was analyzed by Mr. Atwood, whose analysis was published at the time in the MINING AND SCIENTIFIC PRESS. At present none of the quarries are working. The reason is: The quarries were opened and the slate introduced on this coast by people with not enough means to continue work. While the demand has always been greater than the product, the parties could not get enough money to open a large enough space in the quarry to fill the demand.

Slate quarrying on this coast would be a profitable business if properly handled; the supply could be made equal to the demand if capital would interest itself. The statistics of 1897 state that in the Eastern States the product was over 700,000 squares.

Placerville, March 21st, '98.

L. H. Monroe, near Soapweed, has extended his tunnel 400 feet and begun sinking. The prospects are encouraging.

Nugget: W. R. Pearson has struck good ore in the Mount Hope mine, near Grizzly Flat.

An additional force was put on at the Grizzly gravel mine. The property has a 10-stamp mill.

Nugget: A 7½-foot ledge was uncovered at the Grover Cleveland mine.

Elzy & Brown will open the Gray mine at Gray's Flat.

Oakland capitalists are opening the Houx quartz mine near Shingle Springs.

The Grossman and Rose Kimberly mines, in the western part of the county, are showing good prospects.

The Schneider mine, near Diamond Springs, is to be reopened.

The Oma mine, near Fairplay, has been bonded to M. Mendenhall, who is running a tunnel on the vein.

Kern.

The Independence mine, at Randsburg, has been sold to C. C. Thomas and E. W. Woods for $1500. H. C. Oakley bought the Boston.

A 14-inch vein of ore has been encountered in the Camperdown.

Mono.

Bodie employs 100 miners at $4 a day. There are between twenty and forty stamps dropping steadily that turn out two bullion shipments per month.

Nevada.

(Special Correspondence).—Work on the St. Gothard Con. group, near Columbia Hill, is progressing rapidly. The old 1800-foot Delhi tunnel has been put in good condition and 130 feet of new work added. The company found an ore body in the new work. They have, however, begun work at a new place, 300 feet back from the face, and started a crosscut. The work is carried on night and day. The property will be thoroughly developed and its merit determined before any steps are taken toward building a mill.

Nevada City, March 22nd, '98.

(Special Correspondence).—Work on the Judge Caldwell property, to be known as the Stanford mine, is progressing. After years of idleness the present company took up the property under bond and will give it a thorough test. The shaft has reached 400 feet on the pitch of the vein, which is 4 feet and a fair grade of ore. A drift has been started south at the 100 level. The company consists of J. H. Neff, W. W. Montague, G. McNab and Coleman Bros.

Nevada City, March 22nd, '98.

Telegraph: A cleanup from the Wisconsin mine, from No. 5 south drift, of thirty-five tons yielded $21 to the ton.

Supt. Phillips is opening the Gold Bar and O. K. mines and putting in machinery capable of going down 600 feet, which depth will be sought with all possible haste. The mines are two and a half miles from Grass Valley.

Union: The gravel claim between the McKillican and DeNoon mines, near North Bloomfield, is being worked by McIver & Co.

The Jumping Santapede claim, near Nevada City, was sold to Tickell & Shockley. The latter is Supt. of the Phœnix mine and is backed by Eastern capitalists. It is the purpose of the new owners to work it in conjunction with other claims in their possession.

Placer.

(Special Correspondence).—The Paul mine, owned by Paul, Kirby and others of Auburn, in prospecting recently struck some good rock, showing free gold and sulphurets. The last crushing from this mine, at a custom mill, showed $8 per ton gold, with the value of the sulphurets to be learned.

W. P. Black of the Cleveland M. Co. of Cleveland, Ohio, has been examining properties in this district, with a view to purchasing.

Mrs. Roberson, two miles from Auburn, has discovered a good quartz ledge on her farm. On Mr. Druce's property the quantity of float quartz found, and the particles of gold to be found after heavy rains, gives evidence of a good ledge not far distant.

J. Moran uncovered a 6-inch ledge on his farm which returned him $5 per ton, but at a depth of 50 feet water drove him out.

On the Freeman tract, near Auburn, A. R. Green has sunk 30 feet on a 6-inch ledge which shows free gold.

Auburn, March 21st, '98.

The Gold Blossom, near Auburn, has a good body of ore and the 10-stamp mill is running night and day.

The mill at the Mountain Maid quartz mine, near Colfax, is running sixteen hours a day. Water is very scarce.

The Breece & Wheeler Co. at Bath has twenty men on the pay-roll. Some new ground is being opened and enough gravel is mined to keep the mill running about half the time.

Sentinel: At the Morning Star gravel mine the company has sixty-five men on the pay-roll. The Morning Star has been one of the largest bullion producers of the State. The dividend for March was No. 87. The main bedrock tunnel is considerably over 4000 feet. The gravel is crushed by a 10-stamp mill. About 100 cars of gravel are mined during each twenty-four hours. The January clean-up from the Morning Star was on exhibit at the recent Mining Fair. It weighed 1555.94 ounces and was valued at $28,754.70.

At Big Dipper gravel mine men are converting a hydraulic pit north of the mill into a reservoir, which will have an area of over ten acres. The 10-stamp mill is running steadily. About seventy men are employed and 140 cars of gravel mined in twenty-four hours. C. Waterhouse is Supt.

At the Occidental gravel mine, near Grizzly Flat, the distance to bedrock from the surface is 347 feet. A number of prospect drifts have been run. W. Cameron is Supt.

The Pioneer M. Co. in the last nine months, June to February, inclusive, earned $105,487, crushed 6311 tons of rock, which averaged $17.05 a ton, and carried to the surplus account net earnings of $52,922. This is equivalent to over 50 cents per share (par $10). To be more exact, the mine has earned for the stock in the last nine months 5.29 per cent. The gross returns of $14,160 for February—twenty-eight days—were, with one exception, the largest of any month since last June, while the 940 tons crushed give evidence of improved water supply; it was the largest month's crushing since last summer.

Plumas.

The Yick Lee Co. work ten men in their claim on Long's Bar.

The *Independent* says that C. Girand took out $600 in one week on Indian Bar.

San Diego.

Union: The American Girl G. M. Co., composed of H. H. Markham, Z. H. Lowman, T. Johnson, G. H. Coffin and F. S. Daggett, which recently purchased a group of claims, chief of which is the American Girl mine, is showing more activity than any other new company in this section. The properties of the American Girl Co. are situated about four miles northeast of Hedges, near the Golden Cross mine, and much development work had been done on them before they were sold. It is proposed to develop them extensively without delay. The ores of the American Girl are similar to those of the Golden Cross mines, low in grade but extensive in quantity.

The 10-stamp mill at the Helvetia mine, near Julian, is working on ore said to assay $22 per ton.

The San Diego *Sun* says of the Golden Cross properties at Hedges, which were sold a year ago for a trifle over $1,000,000, that a conservative estimate of their present value is $4,000,000. Since C. W. Pauley took charge last July he has paid the defendants, Jas. Spiers et al, $70,000.

It was agreed that the receiver should retain control of the property as long as he paid at least $7500 per month to the defendants on the $260,000 indebtedness. He has done more, and now that the property is paying $20,000 net per month, he will wipe out the entire indebtedness in a much shorter time than at first contemplated.

The mines give employment to 214 men, and the monthly expenses are $250,000. The 100-stamp mill is running day and night, and the repairs are completed on the 40-stamp mill.

In June, '97, the Golden Cross M. and M. Co. sold its interests to the Free Gold M. Co. for $1,000,000 and the debts then due Jas. Spiers et al, amounting to $260,000.

The shaft on the Crown mine is down 600 feet and 200 tons are taken out daily, while the ore is increasing in value with depth. On the Cross mine the 500-foot level has been reached, and the ore is being taken out practically as rock from a quarry.

In the Queen mine they are down 500 feet. This is the richest of the group, but no ore has been taken out of this mine since July.

The miners at Golden Cross get $3.50 per day.

It is known that Col. I. Trumbo is one of the owners of the Free Gold Co., but as it is a close corporation the other owners are not known. It is generally believed that J. D. Spreckels, A. G. Gassen and Receiver Pauly are interested.

Shasta.

The Mullen and Watts mine has ore amounting to between $35,000 and $60,000 on the dump.

Copper ore has been discovered on the Backbone, near Kennet.

McDaniels and son made a sale of mining property on Muletown mountain last week to M. Deming. It is his intention to develop the property immediately.

Democrat: D. W. Dunham is extracting good ore on Mule mountain. He has considerable ore that will go $100 per ton free gold.

M. Page has a number of men at work on promising prospects at Mule mountain.

The Princess hydraulic mine is running steady since the recent rains, as is also the Chapman.

C. Butler of Delta had twenty tons of ore worked which yielded good results. He will ship ore to the Keswick smelter.

Free Press: The Milkmaid M. Co. at French Gulch has resumed sinking in the 100-foot shaft which was put down from the mill level. The mill is running steadily on good ore.

The outlook at the old Washington is encouraging. All of the work is being done by leasers, but after April 1st all leases will be canceled and the company will resume operation of the property.

All the leasers have made money. The Blagrave Bros. took out $2000 in a few days in the upper workings. J. L. Cannon has been working in ore of like value in the level below the Blagrave Bros.

A force has been put on in tunnel No. 6 of the Niagara mine and the mill will soon resume operations.

The lower levels of the Gladstone mine show remarkably good ore. The mill is running.

Work in the Altoona quicksilver mine is being prosecuted vigorously, water no longer interfering with the work. Last season the output amounted to 352 flasks.

F. E. Hunter is developing a quartz mine near Middle Creek station.

Near Copley a rich strike was recently made of a small ledge 15 to 18 inches wide, carrying high-grade free gold ore. The *Free Press* says that assays made along the vein vary from $500 to $720 a ton.

The Gold Rose, near Castella, has a tunnel 83 feet on a 16-inch vein. The rock has not been tested, but shows up well in free gold.

A 40-foot tunnel has been driven on the Blue Bell mine on Castle creek. The rock assayed $7.50 a ton. There are over 150 tons on the dump.

The Mountain Copper Co.'s annual report for 1897 shows that the outlay on new works has been $207,545, of which $195,220 was spent at Keswick, Cal., and the remainder at Elizabeth, New Jersey. Stocks have increased during the year, and the directors are satisfied with results. The yield of the ore in both quantity and quality has come up to expectations. The total quantity taken out has been 105,060 tons—an average of 550 tons per working day. The proportion of copper was, in the aggregate, equivalent to 14,129 tons of copper. The net profit was $315,730, out of which an interim dividend was paid on Oct. 1, '97. It is proposed to pay on the 31st inst. a further dividend of 2½ per cent absorbing the same amount, which will make 5 per cent for the year.

The *Searchlight* says that a strike was made in the Washington mine at French Gulch, which cleaned up $20,000.

Siskiyou.

The Siskiyou mine on Klamath river cleaned up $10,000 and is still worked with a good supply of water.

The Chicago Co., owner of mining property on Klamath river, in the Happy Camp district, will purchase more mining ground in that section, including the Elliott mines.

E. G. McConnell and Dr. Chismore will reopen the old Pacific mine at the mouth of Humbug creek, in Klamath river. A. Smith will be Gen. Mgr.

The Blue Gravel mine has a good supply of water and keeps thirty-five men employed, with probability of giving employment to more men soon, when well opened. When the new shaft is clear of water a crosscut will be run to ascertain the width of the pay channel, supposed to be 300 yards from bank to bank of the ancient creek bed.

News: Two hundred and fifty feet of the new 1000-foot tunnel in the Spencer mine has been completed. Allen Bros. & Owen have a 6-inch vein of high-grade ore at their mine in Tuttle gulch. C. Hutchinson has purchased the placer property and water rights of Swill-up creek at Cottage Grove. It will be worked on an extensive scale.

Wingdam mining on the Klamath will begin earlier this season than usual. The river is already at low water mark and the indications are that this will be a profitable year for river mining.

Capt. La Flash keeps his 3-stamp mill at work on paying ore. The Jillson and Roberts are also doing considerable work, which, with the mills, give employment to about forty miners.

The Pacific mine, below the mouth of Humbug creek, owned by McConnell & Simmons, will be operated this season by E. G. McConnell of San Francisco. He is fitting up the property for work at an early day.

Work is progressing satisfactorily on the Haze Hazlitt mine, near Henley. The tunnel is in 500 feet on a 6-foot vein which prospects from $12.50 upwards.

The Fort Jones *Reporter* says that W. H. Taylor of San Francisco, supposed to be acting for the Risdon Iron Works, purchased 200 acres of gravel properties near Oro Fino, known as the Eastlick and Wright & Fletcher claims. The price paid is $57,800. The sale includes the water rights of Kidder creek. J. O. Rusby, who has been connected with the Risdon Iron Works, will be Supt.; he begins at once to equip the property for extensive hydraulic operations.

Journal: The Minetta B. mine, near Happy Camp, is being worked energetically for the season's run.

The Aromas Co., Salmon river, is crowding work to start the giants.

The Siskiyou Con. Quicksilver M. Co., working the cinnabar chimneys at the head of the west fork of Beaver creek, will resume operations during the coming summer.

The Benz Bar mine, in the Honolulu district, Klamath river, is hoisting pay gravel day and night.

The Vesey Creek Co., at mouth of the creek in Klamath river, will soon be ready to commence mining the river, to run day and night.

Vogan & Mathews will start work in the Classic Hill mine, Happy Camp, in about a week.

Trinity.

Day & Skinner cleaned up $1600 at the East Fork mine, near Weaverville. Skinner's previous clean-up amounted to $9000. At the Enterprise, development work is carried on with encouraging returns.

F. Bighouse sold his one-third interest in the Grizzly quartz and Bighouse placer claims on Coffee creek for $4000.

Leasers on the Brown Bear mine shipped 4500 pounds of ore to the smelting works and their returns were $1400 a ton.

The Indian Creek mine at Indian Creek since the last storm is running day and night.

Tuolumne.

(Special Correspondence.)—The Mullin property, one mile north of Tuttletown, abandoned years ago, was recently secured by new owners and will at once be actively worked. The 400 foot tunnel will be cleaned and retimbered, then depth will be sought from breast of the tunnel. Geo. Blake, whose work in other mine developments has been successful, will conduct the work.

The Belle has been crosscutting at 300 to the hanging and footwall. They have cut a vein 50 feet wide, part of which is a strong body of ore in which gold is perceptible.

The Gagnere is running twenty stamps on good ore, from a good sized vein.

The Arbona, since the rains, has again started its ten stamps. The activity in mining throughout the county is growing quite perceptibly.

The Bonanza G. M. Co., twelve miles south-

east of Sonora, will begin work at once putting the old 147-foot tunnel into shape and will push development work. The property is on the mother lode. The company will put in power drills. J. L. Bryson of Sonora is the Supt.

Sonora, March 21st, '98.

Banner: A. M. Drew and associates have bonded two mines, one at Tuttletown and one near Groveland. They will commence operations at Tuttletown in a systematic way.

The other will be manipulated as soon as the first is in activeness.

The Big Oak mine, in the Groveland district, is showing up well. It is being developed by the Tuolumne D. Co., composed of Fresno capitalists. N. W. Moody is president. The vein is large and yields gold free and in sulphurets.

Construction of the 10-stamp mill at the Sell mine near Sonora goes on. This property is also under the able management of the above named company.

The Grapevine canyon mine, seventeen miles from Sonora, has a vein 2 to 4 feet wide, and a tunnel on the ledge 100 feet. The ore is ribbon quartz, claimed to yield $8 per ton.

In the Draper mine the shaft has reached 300 feet.

The Gagnere mine, near Tuttletown, made a clean-up last week amounting to $6000.

J. Gillis took out a $1200 pocket at Jackass Hill last week.

The *Independent* says that the Golden Rule, near Sonora, contemplates the erection of a 20-stamp mill.

The Draper mine is going to put up a new hoist, to sink on the rich chute discovered in the winze below the 300-foot level.

The claim discovered recently by J. T. Newcomer is showing up satisfactorily. A shaft is being driven on a good ledge.

The shaft on the Slapjack mine is down 20 feet on a good vein. Milling tests show the ore to be worth $43 per ton.

At the App mine the twenty stamps are dropping on ore taken from the stopes on the deep levels.

Yuba.

The Abbio, at Brownsville, is running on good ore. They are sinking on the ledge, and are down about 100 feet.

NEVADA.

Ore is being extracted from the Berlin mine near Midas which yields good values. Shipments of bullion are made regularly.

The Knickerbocker mill has been overhauled and the new machinery is in place and running smoothly. About 175 men are employed in the mines and mill.

The *Gazette* says that the Black canyon mining properties, near Humboldt House, continue to develop satisfactorily. The quartz carries gold, aside from that contained in the galena and sulphurets. Comfortable buildings for the miners' use have been erected, and, though there is still a foot or more of snow on the mountain, all work is being pushed as rapidly as possible. As soon as fair weather is assured, J. C. Pierson will erect a mill, which he anticipates having in operation before fall.

The Glasgow & Western Expl. Co. shipped a trial shipment of slimes and concentrates from the Star mine, which showed a valuation of $20.60 in gold, ninety ounces silver and 11 per cent lead, the whole lot selling at $66 per ton.

Good ore is coming out of the Mary mine, near Hawthorne. The only drawback is the hardness of the rock.

L. Chiatovich has resumed work on his mines at Chuckwalla.

At the Alex Wise sulphur mines in Humboldt county there are ten men taking out sulphur. They have between 600 and 700 tons on the dumps. At the Emmons property there are four men employed developing deposits of sulphur, which is being found in all of the openings made so far.

The Adelaide Star Mine Co. at Cherry Creek is making regular shipments of ore and concentrates.

OREGON.

W. Wiley, fifteen miles above Glendale, uncovered a quartz vein at his placer diggings between slate and porphyry, containing seams of decomposed quartz and clay, from which he secured single pieces of leaf and wire gold that weighed an ounce.

The Oregon Bonanza mine, near Ashland, is being worked by R. Rogers & Son of San Francisco.

The Oregon G. E. Co. are working the cyanide plant near Ashland to its full capacity.

The Robbins-Elkhorn mine, Baker City, has passed to the ownership of W. E. Zwicky and associates, who also have an option on the Baisley-Elkhorn mine.

Miller & Macy will work a big force with a first-class hydraulic plant near Baker City. Last year this claim yielded well and a $521 nugget was one of the pieces found.

A strike was encountered in the Golden Eagle, Baker City. Active operations began in the mine and mill last week.

W. A. Weatherby has three giants at work on his placer mines at Huntington.

Browning & Hannum are running a tunnel on the Greenback ledge near Jacksonville. They have extracted about $10,000 from the mine during the past year. Considerable work has been done on the Elk creek mines during the past few months. The ore will go from $18 to $20 per ton. The Braden mill in Gold Hill district is running day and night on good ore.

WASHINGTON.

Men were put to work on the Jim Blaine, adjoining the Republic. A working tunnel will be run 1400 feet to tap the ledge.

S. I. Silverman and associates of Spokane bonded three claims at Republic for $12,000. A cash payment of $2000 was made. Work has started. The claims are the Liberty, Pittsburg and North Star.

The Golden Chariot M. Co., near Republic, will put men to work at once and push development as fast as possible. The ledges partially prospected on these claims show a good quality of ore. The Little Cave mine at Republic requires a large pump.

The Erdmann M. Co. began development near Republic last week.

The Rebate, in Republic camp, has been bonded by J. Harvey for $30,000. Work will be commenced forthwith with three shifts.

BRITISH COLUMBIA.

(Special Correspondence).—The number of regular shipping mines in the Kootenay this week increased to fifteen. The shipments this year amount to nearly a quarter of a million dollars.

The properties of the Nip and Tuck G. H. Co. (capital $30,000), near Fort Steele, have been sold to an English company for $20,000 cash and 20 per cent stock.

The Maud hydraulic property has been sold to an English company for $101,000, and will be extensively developed this season.

The first compressor plant to be erected on this coast will shortly be put up on the Dorothy Morton, a gold-copper claim on Phillips Arm, controlled by English capital.

Vancouver, March 20th, '98.

(Special Correspondence).—The old Barker drift gravel claim is working with thirteen men and paying 20 ozs. per day.

J. Perkins has given an option on his quartz claims on Burns Mt. to Montreal people at $12,000.

Black River Exploration Co. has given an option to H. Cochrane of Barkerville on three dredging leases on Manson creek, Domineca district. He is to develop the ground, pay $6000 cash and hold three-fifths interest if expert's report is satisfactory.

Ogden and McKenna have given G. S. Cassidy of Seattle a four months' option on their placer at Eight-Mile lake; consideration $30,000.

Barkerville, March 11th, '98.

The Poorman mine at Rossland shipped three cars of ore. This makes 283 tons shipped by the Poorman since January 1st.

The *Spokesman-Review* says that the Texas mine, near Grand Forks, has been sold to an American company for $200,000, of which amount 10 per cent was paid in cash and the balance is to be paid within thirty days.

O. Johnson has sold the Sadie claim, near Rossland, to a British corporation for $20,000. Work is to commence within two weeks. The lead, which runs across the entire claim, is 22 feet wide.

ALASKA.

(Special Correspondence).—The Berners Bay M. & M. Co. are closed down and are in the hands of a receiver since Dec. 14, '97. The company have settled with most of the labor; the heaviest accounts, however, are yet unpaid. Operations will be resumed as soon as spring opens and the Kensington mine is uncovered. The snow is very deep at present.

The Portland-Alaska Co. at Seward have resumed work on the Horrible mine and will start the mill as soon as water power is available.

The Ivanhoe claims have been placed by Mellin & Co. Preparations are on foot for the construction of a 10-stamp mill. This mine is near the Nowell Co.'s mines.

The Jualin will be running on good ore by April 1st. A few men have been doing development work the past winter and have opened a quantity of good ore.

A. S. Kerry has returned from Lake Bennett. He took over the summit to the head of the lake seventy tons of machinery and supplies.

The mines in the Basin will all be operating, same as usual, as soon as the snow goes.

The trams over the summit at Dyea are not running, contrary to many satements.

Juneau, March 13th, '98.

A new discovery is reported from the interior, near the Little Salmon river, which flows into the Lewes from the east midway between the Hootalinqua and Pelly rivers.

The general characteristics of the Little Salmon river are the same as the Klondike river. It comes out of a low valley, with hills in the background, and is not suggestive of a mineral district.

The gold is said to be coarse and as rich in quantity as was the case on Bonanza at the time of the first discovery.

Twenty-five hundred people camped at the mouth of the Stickeen river struck their tents on the 17th and started for the Glenora. Stimulated by the latest reports from the Big Salmon district, which is beginning to rival Klondike, many will go to that section.

THE KLONDIKE.

During the coming season the Alaska Commercial Co. proposes to get 15,000 tons of supplies up the Yukon river and distribute them among its trading posts from Bering sea to Dawson. Last year 7000 tons were forwarded, but much of this amount was started late in the season, after the Klondike excitment began, and some thousands of tons got no farther than St. Michael. This year the company will have thirteen river steamers moving. Five will be new ones, and four of these will be of 1000 tons capacity. They were built on the Ohio river and have been shipped to Unalaska. They are expected to make four river trips between June 1st and freezing time. The company's new 2500-ton ocean steamer St. Paul, now being built at the Union Iron Works, will be launched April 6th.

IDAHO.

At the Black Cloud at Monarch the plans for a mill capable of handling 150 tons of crude ore daily are completed. The ore from the upper workings will be carried to the mill by an aerial tramway.

The Cumberland mine near Silver City is in a pay chute valued at $75 per ton. On the 200-foot level the vein is 3 feet wide and is copper stained. It assays $362 gold and 119 ounces silver.

Twin Springs Placer Co. bought the Plowman & Branstetter placer ground at Idaho City, including all the water of More and Elk creeks. About 1000 acres are involved. The company will work six giants this year and enlarge ditches this fall, so that twenty giants can run next season.

Statesman: The Leviathan, near Pearl, is drifting on a body of high grade ore; five men are taking out an average of a ton of ore each per day. The Checkmate is shipping ore that assays $100 per ton. The Golden Chest has uncovered a large body of base ore. Ingersoll & Hamlin, representing the company that has purchased the Ireton, Nolan & Stephenson claims on the Payette river, began development. They have decided to build a mill at once.

The Hope mine, near Hailey, cut a vein of about 42 feet of milling ore and 8 feet of shipping ore. The milling ore will yield $10 per ton.

N. Treweek has secured an option on the Lucky Boy mine at Custer City, in which he undertakes to pay $500,000, the option lasting until July 1st next. The property is outputting about forty tons a day that yield good results in both silver and gold.

The following is the return for February of the De Lamar mine: Crushed, 900 tons; bullion produced in the mill, $18,845; estimated value of ore shipped to smelters, $1900; total, $20,745; total expenses, $19,115; profit for the month, $1630. February 8th the first cyanide leaching vat was charged, which the Mgr. says is working satisfactorily and success is assured.

The Kellogg tunnel being run by the Bunker Hill & Sullivan M. & C. Co. at Wardner, is in 1600 feet. When completed it will be two miles long.

The Poorman M. Co. of Florence has purchased the Nero and Ivanhoe and will consolidate them with the Poorman group.

The Blossom, in Florence camp, is said to be showing 18 inches of ore.

The little stamp mill on the Comstock mine in Dixie camp is said to have ground out $12,000 in January and a larger sum in February.

This week 350 men at the Morning mine, near Wallace, walked out upon refusal of a demand that all men employed underground be paid $3.50 a day.

UTAH.

The Alliance M. Co., at Park City, started work again on Monday. The *Tribune* says that there will be no consolidation between the company and the Crescent is now assured. It is estimated that in the prospecting of this ground $500,000 has been expended. The Crescent will start work again next week.

Work on the Golden Gate Extension, at Mercur, has resumed. In the development of this ground a shaft has been put to a depth of 110 feet, and ore uncovered showing a valuation of $4.50 in gold per ton.

The ore body discovered in the Treasure Hill at Tintic is increasing in size and value. Five carloads were shipped last week from the new strike.

Strickley & Co. made a 30-ton shipment from the Amazon.

The 46-ton shipment from the Julia Dean last week was $112 per ton.

The product of the placers of Bingham, on account of the small snowfall, will fall off materially for 1898.

In the Dexter mine at Tuscarora the cyanide plant was started March 15th on tailings that assay $12 to the ton, and of this $10 is saved by the cyanide solution. For two years the tailings have lain in ponds owing to litigation, which has been settled. There are 6000 tons of tailings.

The Julia Dean is producing ore that runs 60 per cent lead and over 100 ounces in silver.

In developing new ground on the old Winnamuck mine at Bingham a large body of copper-bearing lead ore was found.

The Geyser-Marion mill was closed down to permit the installation of improvements that will add 50 per cent to its capacity.

MONTANA.

In the trial of the mining suit at Butte between the Butte & Boston and the Montana Ore Purchasing Co. over a copper claim, the cost of producing Montana copper was testified to by F. Klepetko, relating to the value of copper ore of certain grades and the cost of treatment. During the years 1896 and 1897 he said the value of the fine copper in pig at Butte was 9.55 cents per pound. From a ton of 7.2 per cent copper there would be obtained 102.7 pounds of copper, which would make its value per ton $9.81. From this was to be deducted the cost of treatment, which was given as follows:

Hauling to concentrator	$0 19
Concentrating	82
Calcining	38
Total	$1 39

From a ton of ore .42 of a ton of concentrates would be obtained. The average cost of calcining during '96 and '97 was 98.8 cents per ton and .42 of that amount would give 38 cents, the cost per ton on calcination of the original ton. On smelting there would be a further reduction. From every ton put through there would be obtained 78.788 of a ton. Multiplying this by .42, the result would be .83 of a ton. The average cost for smelting was $3.04 per ton, and .38 of $3.04 would give $2.40 as the cost of treatment of the original ton of ore. The cost of converting at Great Falls was 1.4 cents per pound of copper. He figured out the total cost of treatment of a ton of ore up to the time it was made into fine copper at $3.47. This subtracted from the value of the copper in the ore would leave a net value of $6.34 on the dump. The cost of treatment, he said, included office, general and construction expenses. Copper ore assaying 8.61 per cent had a value of $8.32 per ton on the dump. Copper assaying 10.5 per cent had a value of $10.67 per ton, and 15.08 per cent copper had a value of $18.75 per ton, assuming that it would be melted direct. Copper ore carrying a value of 15.08 per cent would give 269.3 pounds of copper, which at 9.55 cents would be valued at $15.71. The treatment charges up to the point of matte would be $4.18, and converting charges $2.80, making the total cost $6.89 and the net value of the ore $18.73. Copper of 27.81 per cent would have a value on the dump of $38.09 per ton. This estimate included everything except cost of extraction.

Picket: The Gebo coal property, near Red Lodge, has been sold. About $75,000 has been expended in purchasing 480 acres of coal land and development work on the Gebo proposition, and about 12,000 acres of land are yet unpatented upon which filings have been made.

The Longmaid Bros. will put in a steam rocker at Garnet to work the placers of that district. It is the intention to try this ground with the steam rocker, and if rich enough to warrant, a large pumping plant will be instantly installed in some near-by gulch and water carried to the mountain top.

A new engine and hoist will soon be placed on the Nancy Hanks at Garnet.

The Shamrock, near Garnet, is shipping from four to six tons a day.

The Forest struck a vein which measures 2 feet of high grade ore.

The Craig mine, near Whitehall, which has been closed for some years, will at once be reopened. The 100-foot shaft will be retimbered. This is a copper proposition. Yaeger & Cannon of Butte have bonded the property and will push the work.

Maloney & Co. shipped two cars of ore to Great Falls which netted them $2129. The ore averages fifty-five ounces of silver and 49 per cent lead to the ton.

The question as to how many years copper mines at Butte will hold out will be considered practically settled by experiments of the Anaconda Co. In the 1600 level of the Anaconda and other deep mines of Butte ore has been found in places that runs 80% copper. The Anaconda Co. began prospecting some time ago with diamond drill and reached 600 feet below lower levels, which is 2200 feet from surface. Core brought up by drill is said to have run 80%. Core is 2 inches in diameter and 2 feet in length. The Boston & Montana has also experimented with diamond drill, and from points 2000 feet from surface has brought up samples showing great richness. Experiments will be continued to 3000 feet below surface.

At Radersburg a good strike is reported in the Left Hand of a large body of first-class concentrating ore, also a small stringer of quartz that will run high in values.

The English Co. at Radersburg cut a 4-foot vein worth $40 a ton. The camp produces $10,060 a year in placer gold.

In the Alice mine at Walkerville a breast of ore on the 200-foot level is yielding 200 ounces of silver and $40 in gold to the ton.

A one-half interest in the Hard Luck and Fisherman placer claims, near Libby, was sold to J. Baldwin for $1000 cash.

J. Bordeaux and associates have pulled the pumps from the Ella mine on Meaderville flat, near Butte. The shaft, 252 feet, will be allowed to fill with water. It is stated that good ore has been taken out, but that the machinery is not sufficiently strong to continue work on account of the large quantity of water. Work on the Bordeaux and Mascot claims will be carried on.

SOUTH DAKOTA.

The Minnesota property at Rochford will resume operations at once.

Pioneer Times: Doherty & Leonosia, driving a tunnel near Rocheford, struck a large ledge of fair grade free-milling ore.

MICHIGAN.

The Red Jacket shaft of the Calumet & Hecla began producing copper from the 37th level. The shaft is vertical and nearly one mile deep. It was begun in 1889 and has cost to date, with equipment, over $2,000,000.

COLORADO.

The Denver *Mining Record* says that C. Poulot, representing a chemical plant in Paris, has been in the city for five months, purchasing ore of uranium and other rare metals. He has secured but twenty-six tons, which brought an average of about $400 per ton, though some rich dots brought as high as $800 per ton. This metal is characteristic of many of the Gilpin county mines, but is treacherous, occurring in pockets of greater or less extent, with no certainty of finding further deposits without expending more to find it than was yielded by that already found. On account of this uncertainty of supply, Mr. Poulot has been unable to make contracts for future delivery, and steel manufacturers who use uranium are in turn deterred from contracting ahead for more steel than can be made with the metallic uranium in sight. Mr. Poulot says that all he gets is sold immediately, upon the completion of the assay in Denver. In the course of his investigation into the deposits of uranium in this State, Mr. Poulot found the Wood mine in Russell Gulch, Central City district, is rich in uranium, which seems to run more regularly than usual.

The *Republican* says the Smith-Moffat improvements at Goldfield will be rushed this spring, and in addition to the electric power plant and sampling works of 800 to 1000 tons capacity per day, the Florence & Cripple Creek road will make Goldfield a main line station. At present the samplers in the district have considerable advantages in buying ores at the $19 per ounce rate for gold, as nearly all the heavy shipping mines have contracts with mills whereby they get $20 for their gold ores at the regulation charges per ton for treatment.

The Garfield-Grouse at Cripple Creek is producing daily twenty-five tons. The ore is shipped in three grades, running from $80 for screenings to $500 a ton for high-grade smelting ore. Five tons of smelting ore from the Osborne lease on the Porcupine netted $400 to the ton.

The Bird & Gill shipped forty tons of 2½-ounce ore recently and is getting out twenty-five tons daily. Tanna & Lee made their in-

itial shipment, assays on the vein returnig gold values of from four to seven ounces to the ton.

The Sommers on the Vindicator has been sold. As a result of the transfer, an increased force will be put to work at once. The production for last week was four tons of high-grade ore, one car of five-ounce screenings and two cars of $30 ore.

In the Lillie on Bull hill the ore chute produces 1000 tons a month, and this could be increased should it be deemed wise. Last month 2400 tons were hoisted, of which one-half was of an average value of over 2½ ounces.

The London and Cripple Creek Reduction Works at Florence, recently sold under sheriff's sale, will be redeemed before the expiration of the legal term and started up again by the company. The necessary funds have been subscribed and the company reorganized. In addition, a roaster will be erected and additional machinery necessary to the treatment of Cripple Creek ores introduced.

Denver *Republican*: The Anaconda at Cripple Creek is shipping two cars of mill ore a day and a considerable amount of development work is under way. The lessees on the Excelsior are getting high-grade smelting ore from the McQuarrie vein. One carload shipped last week ran slightly better than twelve ounces to the ton. The present workers opened a new level, and have cut into a higher grade chute.

The Garfield Con. Co. will allow the money coming in as royalties from the Garfield-Grouse to accumulate and provide a fund for opening the property on a broader scale after the expiration of the lease.

Babbitt Bros. are making occasional shipments from the Prince Albert on Beacon hill.

Denver *Republican*: The Gold Coin mine in Victor last week reached its 420-foot level. At 200 and 300 feet the Coin had a vein carrying 13 feet of low grade ore and outshipping any mine in camp, but the last hundred feet has shown a remarkable change. Three feet of the vein matter has tripled in value, now running $100 per ton, while the remainder of the lead shows a proportionate increase. Successive levels will be run until the depth of 1000 feet is gained. So far the Coin is a dry mine. An output of 100 tons per day is being kept up, aside from the extensive development work.

At Victor the Jolly Tar, which has been shown to be an extension of the Strong, has steadily produced seven cars of ore averaging $25 per ton since the first of the year.

The Jefferson is leased to the Independence Ex. Co. until July 1, 1898. The bond is for $50,000, and all but $16,000 has been paid.

The ore chute in the Monument was opened about a month ago. It is 6 feet thick and is rich with sylvanite. Twenty tons, averaging $110, have been taken from the strike. The Portland Co. has sued the Strong for ore alleged to have been taken out of the Four Queen's lode and valued at $50,000. The *Republican* says that the Strong will probably admit the taking of the ore and set up the claim of ownership to the vein. Bird & Gill of the Wisconsin are taking out twenty-five tons of $50 ore every day.

The Pick-Up on the Six-Points is one of the new shippers of Bull hill. Small shipments of $40 ore have been made.

The shaft of the American Eagle is down 800 feet and W. S. Stratton will continue until he reaches the depth of 1000 feet.

The Modoc made its usual output of four cars last week, running from $300 to $500 a ton.

Kellum & Carpenter, after reaching the ore in a crosscut at 130-foot depth, upraised 85 feet and drifted 40 feet on the vein, showing a continuous ore body averaging in width 3½ feet and paying from $40 to $2000, with an average of three ounces.

In the Independence mine, near Silverton, several carloads are awaiting shipment. The estimated value of the ore is $50 per ton. The Bonner claim will ship six carloads in early April.

The aggregate output of the prominent Cripple Creek mines is averaging better than $1,000,000 per month. It is said that nine out of every ten of the miners employed in the district are doing prospecting and development work to one that is producing ore. Conservative managements are paying more attention to development work than to production, insuring a gradual increase of output for years.

Last week the Golden Cycle Co. shipped 350 tons of ore coming from an ore body 4 feet wide and containing quantities of sylvanite.

Ore shipments from the Moon-Anchor last week amounted to 100 tons of smelting ore.

Production from the Anchoria-Leland last week amounted to 120 tons of an average grade of ore.

The Fort Wilcox at Cripple Creek has made a valuable strike. In places it shows free gold, but the average of the whole, so far as explored, is estimated at $16 per ton. Hannaum, Brown & Co., operating the Abe Lincoln, are shipping ore each week. The last consignment was fifteen tons. They contemplate sinking for another level, but to do this a new pump will be necessary, which will be placed in the near future.

The Tomboy mill at Telluride, having a capacity of 200 tons daily, has begun operations. There is enough ore opened up in the lower workings to supply the entire plant, but there is a scarcity of water for milling purposes at present.

The Gold and Silver Coin property at Idaho Springs, operated by the Jason M. Co., is shipping gold and silver ore.

The stopes of the Silver Age mine are being worked by Daily & Co. with good profit. Years ago there was a large amount of ore left in this mine that would not pay for handling, which now pays a handsome profit. The Shafter mine continues to put out ore regularly. It has been worked for ten years.

The Woody Co. has leased and purchased a number of prospects on Little Jim creek, near Jamestown, some of which are being developed by sinking shafts and drifting. The company will build a mill of 100 tons daily capacity when it can be decided what process is best adapted to treating the ore of this section.

Post: The Little Johnnie tunnel near Whitehorn was leased for $25,000 for a term of eighteen months to C. B. Wider & Co., who will begin work at once. The development on this claim consists of a 20-foot shaft and a tunnel 100 feet. The shaft shows a 7-foot vein that averages $13 in gold to the ton for the entire width.

The Nancy Hanks was bonded to P. R. Eyke & Co. for $17,000. Forty shifts per month are to be worked and 10 per cent royalty on all ore taken out during the term of lease is to go to the owners. C. W. Burton will take charge and push development.

The Eureka tunnel, with forty tons of ore on the dump, was leased by Wider & Co. for twelve months for $16,000 and 20 per cent royalty. Work on it will continue with increased force.

The East Notaway, near Idaho Springs, down 210 feet, has four levels in pay ore, and is making regular shipments, carrying average values of $75 per ton.

The '76 G. M. Co., at Idaho Springs, makes daily shipments averaging fifty tons; fifty-five men are employed. This property was bought by W. P. Bonbright & Co. last October for $127,500. The company is preparing to change the present equipment to a 40 H. P. plant.

The Virginius mine, near Leadville, is shipping mineral of a good grade. The last lot averages 60 ounces silver and comes from a 2-foot streak. The production of the Ibex Co., makes a steady shipment month after month.

A shipment of forty tons went from the Katherine, on Raven hill. The monthly output of the Anaconda mine is about 500 tons. The Hines lease on the Pharmacist, Cripple Creek, has come into a big body of ore on the 250-foot level, where there is a showing of 5 feet of quartz that averages $18 per ton.

The group on Bull hill, embracing thirty-one acres, was sold to E. Parvin for $40,000.

The Portland is producing ore from the fourth, fifth, sixth, seventh and eighth levels; rock that goes to the smelter will average $80 to the ton. The shaft is 875 feet.

The Colorado King leasing company, after sinking to a depth of 130 feet, returned to the 65-foot level and are driving after the ore chute and otherwise prospecting at that point.

Yost & Co. made a twenty-ton shipment of mill ore that is reported to average $20.

Record: The O. & N. tunnel, at Ouray, has been in good gold ore the past month and the returns will net between $30,000 and $50,000. The shipments will average a car per day of high-grade ore.

One hundred and seventy cars of ore were shipped from Ouray station during February.

The McCarrier Bros. send their pack trains of ore from the Cascade several times a week.

At the Walsh mill, at Potosi, the average output is fifty tons per day. Two pack trains per day come from the Camp Bird mine with concentrates. A three-days' output brought a return of 180 ounces in gold.

Reporter: The Wolftone, at Leadville, continues large shipments of sulphides.

The Maid properties keep up an output of both lead carbonates and manganiferous iron ores. Ground is made to pay that several ago, when silver was above the dollar mark, was thought to be exhausted. The same can be said of Rock hill where large bodies of low-grade carbonates lay idle for years.

Little Ella Hill is conquering the water and in a short time will resume her production.

The production from the Orphan Belle, Cripple Creek, is 800 tons a month.

The Lafayette, on Bull hill, at 400 feet, is cutting into a 6-inch seam of ore that gives average assays of $35 a ton.

NEW MEXICO.

New Mexican: The Red Bandana properties, near Elizabethtown, are producing $80 ore from the Moreno claim at a depth of 180 feet, and $15 ore from the Red Bandana claim. The Moreno ore chute is a recent discovery. The vein is 18 inches wide. The Red Bandana tunnel is in 750 feet.

The Klondike, near Elizabethtown, has attained 160 feet depth. The vein matter has been drifted on 70 feet and no walls encountered.

H. H. Argue will resume work on the Moreno valley placers this month with a dredge. The average value of the ground is said to be 30 to 60 cents per cubic yard.

The Mattie Belle property has been sold to Eastern people. The development work consists of an 80-foot shaft showing a 2½-foot vein, giving from $28 to $87 assay values.

The Aztec mine is again in active operation, under the management of R. C. Wilson. The values of the ore now worked range from $4 to $8 per ton, but drifts are being extended to cut the ore body in the old workings of the mine. The vein in the old workings is 30 feet wide, but the methods of timbering in vogue could not hold the ground.

The Rebel Chief property has resumed operations. The work of retimbering and building new chutes is progressing rapidly. Recent shipments from the James lease on Rebel Chief No. 1 gave $160 per ton values. On Rebel Chief No. 2 the values average $30 per ton. The management of the properties has passed into the hands of Chicago parties.

The Confidence mine at Mogollon is turning out eighty tons of ore per day.

Martyr & Co. have opened a body of pyritic and galena ore near Oak Grove.

Thomas & Johnson, in the Deadwood mine at Mogollon, have a general average of ore running $16 gold and $21 silver per ton.

Over 300 miners and mechanics are now working in the Cochiti at Bland.

All of the iron mines at Gray have been acquired by the New Mexico M. Co.

Two Republics says that J. F. Simmons discovered a vein near Casas Grande, in the State of Chihuahua, from which he took several hundred pounds of silver ore which assays 842 ounces to the ton.

The recent experimental run of the Bland mill proved to the satisfaction of Mgr. McPherson that both the white and yellow values contained in the Lone Star and other Cochiti mines can be reduced by the cyanide process at an expense that will make it profitable to mine and treat the ores of the district that run as high as $4.

The Lone Star mine has paid profits at the smelters after deducting closely transportation charges. Since 1893 it has shipped ore to the smelter that returned about $75,000 in gold and silver. The average value of the ore was $40 per ton. The Lone Star ledge varies in width from 20 to 32 feet.

New York capitalists, represented by S. M. Ashenfelter, paid $1000 for a year's option on the Climax and Standard mines, near Silver City, the purchase price of the properties being $15,000. It is the purpose of the purchasers to actively push development work, and determine the value of the properties without delay. It is said that D. J. Dornan will take charge.

Bell & Davidson, lessees of the Golden Giant mine, near Pinos Altos, have a large force at work and the prospects are good.

Z. Hirshberger, at Pinos Altos, is working fifteen men and making shipments right along with good results.

The Othello and Desdemona, near Cook's Peak, belonging to the Kansas City S. & R. Co. of El Paso, produced 10,800,000 pounds of lead and 81,500 ounces of silver in '97.

ARIZONA.

(Special Correspondence). — The United Verde Copper Co. is operating five furnaces and six converters.

The Jerome Copper Co. is developing some claims south of the United Verde properties. Development work has resulted in finding ore which carries good values in copper, gold and silver. The Venture mine, adjoining this, belongs to the United Verde and is pretty well developed and runs high in silver. It is claimed that 500 tons of ore from the latter yielded $700 per ton in silver.

On the western slope of the Black range (Jerome being on the eastern slope) the Emmett is producing gold ore, working a force of twenty-five men and operating a 10-stamp mill. In the same locality the Golden Gate is being developed by Kansas City parties, who, it is claimed, will erect a cyanide plant.

The Midget is also being slowly developed in the same locality. WASCOTT.

Jerome, Ariz., March 18th, '98.

(Special Correspondence). — Lynx Creek, twelve miles southeast of Prescott, has three stamp mills and several properties under development. Among them are the Pine Mountain, Favorite, Hidden Treasure, Sheldon, Orient, Star and Black Diamond. The Favorite was recently sold to Collins & Co. for $15,000. The Pine Mountain is working under lease to McKinley & McNally. The ores of the district are a sulphide of iron, carrying gold values, and in general are concentrating propositions.

In Big Bug district the Providence Co. is opening the Annie group. The work of development has gone on rapidly. At present the output is measured by the capacity of a 10-stamp mill.

The Red Rock, a prospect, is being fitted out with steam hoist.

The McCabe mine has been developing the past year, with the purpose of opening the property extensively. The product is in the shape of concentrates, carrying mainly gold. This property employs forty men. E. W. Wells is Mgr. and J. J. Coleman Supt.

The Jessie, at Chaparral, is operating a cyanide plant on 10,000 tons of tailings, the values extracted by this method being about $6.50 per ton. The last ten tanks, it is stated, averaged about that amount. The Jessie shaft is 600 feet deep, with levels every 100 feet. One-half of the ground is stoped. The high-grade ore runs from $80 to $250 per ton, the low-grade from $5 to $10 per ton. The property comprises seventeen claims.

The Gold Note mine, at Richenbar, forty-six miles southeast of Prescott, on the Agua Fria river, is developed by a 300-foot shaft, 600 feet of drifts on the third level and 1000 feet on the second. A second working shaft is 200 feet deep. The vein is about vertical, having a width of from 2 to 30 feet. The walls are a schist. The ore is a sulphide of iron and lead and partly free milling. The 10-stamp mill, with concentrators, is operated by electricity generated by water power in the Agua Fria canyon, 800 feet below the mill. A pipe line and flume two miles long conveys the water to the power plant, which also pumps water to the mine and mill, 800 feet above. The Hearst estate is said to be chief owner.

The Crowned King mine and mill and the Gladiator mine and mill are well equipped properties, near together, in the Bradshaw mountains, forty-five miles south of Prescott. The Crowned King has three tunnels, one of 1900 feet, one 800, and another 100 feet. Drift work on the five levels aggregates 5600 feet. A new shaft is to be sunk. The present working shaft is down 1400 feet from the main tunnel. The vein walls are slate. The ores are base, being sulphide of iron, lead, zinc and copper. The ore output for 1897 ran about $26 per ton. A 10-stamp mill is in operation. An attempt was made to cyanide the tailings, but without great success. The mine produces sufficient water for milling purposes.

The Gladiator, on the opposite side of the mountain from the Crowned King, is developed by five crosscuts, which cut the vein at from 75 to 650 feet. The ores are similar to those of the Crowned King, though the vein structure is harder. A 10-stamp mill is in operation. The management contemplates putting in concentrators. Several thousand tons of tailings are said to be worth $30 per ton. The mine has 2000 feet of drifts on the vein. A. Falco is Supt.

The Diamond S. mine, locally known as the Luke property, is shipping high-grade silver ore. The ore is of a siliceous silver-lead nature, of shipping value. The company is J. W. Searles and associates of Salt Lake City. Twenty men are employed. This property is three miles from the Crowned King.

The Oro Bella, an old property in the same locality, is working under lease to Hall & Boyer. A small mill is on the property.

The Rapid Transit, owned by Hinkle of Prescott, is being worked by lessees.

Mr. Searles of the Diamond S. is also developing the Silver Dollar property, adjoining the Diamond S.

The Venezia, fourteen miles south of Prescott, has recently been taken charge of by Tomlinson & Hall under a bond and lease. This property is equipped with a 50 stamp mill.

The Sundance mine and mill are operating under the superintendence of Mr. Donaldson.

Hall & Sullivan of Leadville are erecting a cyanide plant at Goldfield, forty-two miles east of Phœnix, and the Searles G. M. Co. contemplate building a similar plant at the same place. WASCOTT.

Prescott, Ariz., March 15th, '98.

Republican: The sale is announced of the Continental group, near Globe, for $50,000. This is a gold and copper proposition and has upwards of $50,000 in development and hoists.

At the United Globe only the 160-ton jacket will be utilized after it has been placed in perfect condition. There are about 200 men in all departments at work. The force will be increased gradually until about July 1, when 400 men will be on the payroll.

Extensive work begins at an early date on the Black Diamond group in the Dragoons, recently bonded to N. O. Bagge.

The Old Glory in Pima county, in a run of thirteen days, cleaned up over $1200.

The Commonwealth at Pearce employs 100 men. The ores are free milling and the values both gold and silver. The high-grade ore is not milled, but shipped to the smelters.

On the Copper Glance, near Tucson, over 800 feet of development work has been done. The grade of ore is high.

B. Dunlap has bonded one of his mines on the Grand Reef ledge for $25,000.

Yavapai county is working up placer mining operations in the southwest. An Eastern company has secured 5600 acres about Walnut Grove and will work it extensively.

C. T. Hine sold to Perry & Howe a two-thirds interest in a number of mines in Yavapai county for $1500.

It is said that the Swiss Belle M. Co. will shortly put in a new crushing plant at their mines in Santa Maria of sixty tons daily capacity. The company has a cyanide plant in operation.

Work is being rapidly pushed on the South Bisbee Co.'s claims. The shaft is in a formation of iron and lime. It will be sunk 100 feet before any other work is started. At its completion two other shafts will be started and a steam hoist put on shaft No. 1 to sink to the depth of 200 feet.

The Copper King of Arizona, near Bisbee, is down over 580 feet in a hard formation.

The Twin Buttes, south of the Azurite mines in Pima county, continue to show rich copper as depth is reached. The Bain group is showing gold, silver and copper ore.

The United Verde Copper Co. will increase its output from 500 to 750 tons of ore per day.

Three carloads of copper bullion were shipped from the Saginaw last week. The smelter and mill are continuously at work.

Ten of the old eighty stamps at the Vulture mine were started up last week on ore from a new strike on the Vulture property. The vein has assumed widths varying from 20 to 30 inches, with increased values at depth. Considerable ore was taken out during the progress of sinking. This new prospect will be worked with vigor until it is thoroughly developed. The ore resembles the old-time Vulture ore, with the same sprinkling of free gold.

Twelve miles from Vulture is the Garcia, a young property. It has produced considerable rich ore, much of which is on the dump at the mine waiting for the 10-stamp mill to be completed.

J. Philips has started work on his Centipede mine in the Hassayampa district. The ore carries 300 ounces silver and nine-tenths of an ounce gold per ton.

The Casey mine at Dos Cabezas has been sold for $80,000. The money has been paid, but the deed has been placed in escrow. The Climax changed hands last week, the price being $15,000, 10 per cent of which was paid down.

The Copper Bell group near Geronimo has been bonded for $50,000.

The Longfellow mine near Pima has been opened, the ledge showing 6 feet in width. Copper is said to go 60 per cent and $20 in gold.

Work on the lower level of the Azurite mines near Tucson began this week. The ore shows a good percentage in gold, running from $4 to $17 per ton.

The Lost Squaw group near Yuma has been bonded to G. Bradley for $6000. He has let a contract for 100 feet of development work, which will be begun April 1. The deposits are copper and carry some silver and gold.

MEXICO.

One thousand tons of copper bullion and matte were shipped last week from Santa Rosalia to Europe.

Two Republics says that asbestos has been discovered in the valley districts of Oaxaca.

ONTARIO.

The Triumph C. M. Co., capitalized for $50,000, paid up, contains about 200 acres and cost the company $18,500. The plant comprises a steam hoist and 2-stamp mill. The latter is to be discarded and a regular stamp mill will be put on the property so soon as development will warrant its erection. The

management is in the hands of A. B. Upton of Rat Portage.

The Randolph, in the Seine river country, will sink another shaft with a double shift, so as to open the mine ready for a mill. The present shaft is down about 200 feet and the showing is good.

The Foley mine is working regularly. The mill has been running night and day. There is now $150,000 in the company's treasury, which will be devoted to opening up the mine.

The Alice A. mine has two shifts sinking the shaft.

Coast Industrial Notes.

—Hay in San Francisco is selling for $23 per ton, the highest price in fifteen years.

—The Fulton Engineering and Shipbuilding Works of San Francisco are turning out four fine steam vessels for the Alaska trade.

—From Sydney, N. S. W., the steamship Alameda for San Francisco has on board £500,000 in gold. The amount forwarded in the last eight months aggregates $17,500,000.

—The output of petroleum at Summerland, Santa Barbara county, Cal., is increasing. The *Advance-Courier* says: Sixty carloads, 8000 barrels of oil, left Summerland this month.

—The annual ruin of the California fruit crop is announced as usual. The losses by frost, etc., are always heard from. Later on will come more favorable reports and, ultimately, a supply of fine fruit.

—At Marysville, Cal., last Monday, the Blue Lakes Water Co. connected with the power plant of the Yuba Power Co., which produces its current from generators operated by 2800 inches of water under a head of 295 feet, twenty-three miles distant in the Sierra Nevada.

—The Pacific mill at Tacoma, Wash., the largest shingle mill in the world, operated by Metcalf & Wade, was destroyed by fire last Tuesday. The property is owned by the Sather Banking Company of San Francisco and its loss will be about $100,000. There were 3,000,000 shingles in the kilns. There was no insurance on stock.

—Prof. Frank Soule, dean of the College of Civil Engineering of the University of California, and Instructor L. E. Hunt have recently been testing the strength and quality of California marbles. The results of the experiments, says the *Times*, show that the California marbles possess remarkable strength. They are crushed at a pressure of from 250 to 1000 pounds to the square inch—more than twice the strength of foreign marbles.

—The Fresno, Cal., *Expositor* says the last mile of wire of the power line between Fresno and Hanford of the San Joaquin Electric Co. is put in place, and the line is now ready for use. It will be April 1st before the extension will be in operation. The delay is caused by the electric supply company being unable to supply the motors and step-down transformers in time. This is the longest transmission line in the United States, and electricians are watching the outcome of the venture with much interest.

—Last year an American firm secured a concession from the Royal Government to construct a railroad in Corea, the first and only one in that country, and its construction and equipment have gone steadily forward. The railroad is of the American standard gauge—4 feet 8½ inches—and extends from Seoul, the capital of Corea, in the north, to Chemulpo, the chief seaport, in the south, a distance of twenty-five miles. The locomotives are of the six-coupled side-tank type, with cylinders 14 inches diameter by 22 inches stroke.

—Regarding the statement in last week's issue of the coming control of the Oregon Short Line by the U. P., a gentleman entitled to speak authoritatively on the matter says: "There is no truth whatever in the current reports of the absorption of the Oregon Short Line by the Union Pacific by means of an issue of new securities by the latter company. One cannot prophesy what may happen in future years, but there is no reason in sight for any change in the status of the Short Line or its management." Still, the facts are believed to be as previously stated.

—Pres. A. H. Paget of the Chihuahua and Pacific Railroad Co. signed a contract last week with the Nassau Construction Co. of New York City, for the construction of a steam railroad in Mexico, from the sea to the silver mining regions of that country. The total distance from Chihuahua to the Gulf of California is 350 miles, and under the terms of the contract 120 miles are to be completed before November 1. The chief owners of the railway company are Col. O. H. Payne, Moore & Schley and Mr. Paget. The contract is the largest made in this country for steam railroad construction since 1893.

—The California Manufacturers and Producers' Association held its annual meeting on the 23rd and elected directors for the ensuing year. The officers' reports show that the association is prosperous and has accomplished a great deal to protect and enhance the trade and industries of California. Manufacturers no longer need to conceal that the goods they offer in the market are produced in this State. The following directors were elected and will choose officers from among their own number on the 29th inst.: Jas. W. Kerr, A. Sbarboro, W. F. Bowers, Frank L. Brown, L. R. Mead, Chas. R. Allen, A. McLaughlin, J. P. Currier, Samuel McKee, Chas. H. Crocker, E. Everett.

—The progress of the Trans-Siberian railway is such that the Russian press states that the Minister of Ways and Communication has opened freight and passenger traffic on the Obi-Krasnojarsk section and along the Tomsk branch line. A regular service of trains has already been established between Ichelabinsk, in Western Siberia, and the Obi, a distance of 2600 versts. The rolling stock now in use has already proved to be insufficient for the demands made upon it. In consequence of this deficiency, an immense quantity of freight could not be carried, and even now a considerable amount of freight cannot be conveyed by rail. Considerable more rolling stock will be required, and the opportunities for manufacturers to make sales for this road are considered good.

—For several years a railroad over the Andes, connecting Santiago, the capital of Chili, with the transportation system of the Argentine Republic, has been under construction. Several contractors have in these years abandoned the work. The Argentine government has extended its lines to the boundaries of Chili and the Chilians have laid tracks to the snow line of the Andes. M. P. Grace, of W. R. Grace & Co., is reported negotiating with the Chilian government for a contract to complete the roads. If he takes the contract to complete the trans-Andean railroad it will be finished on time. There is another enterprise on foot for the construction of a railroad through another pass in the Andes at a much lower altitude, 100 miles south of Santiago and west of the city of Talcahuano. It is claimed that the expense and difficulties will be less.

Commercial Paragraphs.

THE Colorado Iron Works Co. of Denver, Colo., are installing a gravity tramway on the property of the Golden Star mine, located at Black Hawk, Colorado.

A VULCAN double-rope tramway to handle 300 tons of tailings daily, is being constructed for the El Triumpho mines, Lower California, by the Vulcan Iron Works of this city.

THE General Electric Co. has the contract for the four 75 H. P. motors to be used on the Park & Ocean electric line now building from the San Francisco park to the beach.

THE Union Gas Engine Co. shipped this week two 50 H. P. marine engines to Auckland, New Zealand, by the British steamer Moana. These engines are to be placed in a new 350-ton schooner which is to be used in the meat trade.

FRASER & CHALMERS, Chicago, have become general sales agents for the United States, Mexico, British Columbia and all other foreign countries for the Green Rotary Pressure Blowers. The Green Blower is considered by many the coming machine for use in blast furnaces for the reduction of gold, silver, copper, lead and iron ores.

MINING, Tunneling and Quarrying Machinery Catalogue No. 41, the Ingersoll-Sergeant Drill Co., 26 Cortlandt St., New York City, in green and gold, on heavy plate paper, with tone and sectional drawings and descriptions of rock drills. The illustration and description of submarine rock excavation is new, as is much of the other contents of the book.

THE Colorado Iron Works Co. of Denver, Colo., made a shipment of five carloads of machinery for the Randsburg-Santa Fe Reduction Co., who are installing a 50-stamp mill plant and a sampling mill at Barstow, California. The balance of the machinery will be shipped as soon as completed. They also report shipment of a 10-stamp mill plant of machinery for Dr. Nelson, to be erected near Milford, Utah.

CATALOGUE No. 16, "Gold Dredging on the Feather River, California," from the Risdon Iron Works, Howard and Beale Sts., San Francisco, is a profusely illustrated description of the Postlethwaite dredge, designed and built by them for gold dredging. The large, full-page half-tone engravings are from photographs of the dredger in actual operation, and give an excellent idea of the nature and character of the work. The catalogue will be sent upon application to any address.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

TILE ROOFING.—Joseph C. Bayer, Portland, Or. No. 600,606. Dated March 15, 1898. This invention relates to that class of roofing technically known as "metal Spanish tile." The object of the invention is to provide a thoroughly waterproof roof covering and secure the same to the roof in such a manner as to allow for expansion and contraction. This is effected by a novel construction of the tiles with devices by which two or more sheets of such tiles may be interlocked both vertically and laterally. The roof plate is composed of a single sheet of metal stamped out so as to form a plurality of tiles having an essentially straight and continuous locking seam and engaging tongue upon opposite edges, each of which extends the full length of the whole number of tiles formed in the sheet. The sheet may represent any number of tiles both transversely and longitudinally, there being butts formed across the sheet to represent the overlap and intersection of the tiles longitudinally. In addition to the interlocking edges, a protecting water edge is formed and a nailing strip extends outwardly from the water edge with a flange or tongue which extends from the adjoining sheet so as to fit into the lock.

Personal.

PREST. F. LEONARD of the Comstock Tunnel Co. is in San Francisco.

D. R. OLIVER, Supt. Bonanza mine, Sonora, Cal., is in San Francisco.

CAPT. THOS. COUCH is examining mining property at Mercur, Utah.

CHAS. BUTTERS is expected in this city from South Africa about April 20th.

C. P. GRIMWOOD, Supt. Dreisam mine, Sonora, Cal., is in San Francisco.

F. W. WILMANS, Pres. Rose Creek M. Co., Sonora, Cal., is in San Francisco.

EUGENE KNAPP, late assayer at Comet City, Alaska, is now located at Juneau.

T. T. LANE, Supt. Utica mine, Angels, Cal., is in San Francisco from Ely, Nev.

J. H. GILMORE of the Golden Cross properties, Hedges, Cal., is in San Francisco.

W. R. FISHER succeeds J. L. Grimes as Supt. Gold Blossom mine, Auburn, Cal.

J. C. DIAMOND, managing owner Limpensel mine, Placerville, Cal., is in San Francisco.

L. R. MEAD, Secy. Risdon Iron Works, has returned from Oro Fino, Siskiyou county, Cal.

J. L. JOSEPH, Supt. Gerrymander mine, Sonora, Cal., has returned home from San Francisco.

J. L. BRYSON, Supt. Bonanza G. M. Co., Sonora, Cal., has returned home from San Francisco.

T. B. DILLON, Supt. Columbia mine, Plymouth, Cal., has returned home from San Francisco.

J. HICKEY has resigned as Supt. Dexter mine, Tuscarora, Nev. His successor has not yet been named.

GEO. J. HOFFMANN, mining engineer, who has been associated with Ross E. Browne of this city for several years past, starts in a few days for the Klondike, under engagement to examine some properties for an English company.

Recent California Mining Incorporations.

Covina Yukon D. & E. Co., Covina; capital stock, $20,000; subscribed $5750; J. Villinger, F. M. Chapman, C. E. Bemis, J. K. Bashor, A. Warren, O. J. Osham, M. Baugh.

Mistletoe M. Co., Grass Valley; capital stock, $100,000; all subscribed; W. J. Rogers, T. H. Wilhelm, J. F. Thomas, F. J. Jones, D. E. Morgan, E. B. Power.

Hall Con. M. Co., San Francisco; capital stock, $1,000,000; subscribed $50; M. W. Fox, H. Otersen, J. M. Wright, A. B. Moulder, B. W. Haines.

Douglass M. Co., San Francisco; capital stock, $1,000,000; subscribed $500; F. R. Webster, H. R. Mann, T. C. Coogan, W. L. B. Mills, A. M. Burns.

Monte Vista G. M. Co., Oakland; capital stock, $100,000; subscribed $600; S. L. Potter, F. E. Pierce, F. M. Farwell, G. Burback, J. S. White.

J. G. Peters M. Co., Sacramento; capital stock, $100,000; subscribed $10,000; J. G. Peters, N. A. Lash, S. A. Street, J. J. Dunckhorst, T. M. Lash.

Recently Declared Mining Dividends.

Gold Coin, Colorado, 1 cent per share, $10,000; March 25.

Mammoth, Utah, 5 cents per share, $20,000; payable April 1.

Geyser-Marion, Utah, 2 cents per share, $6000; payable April 1.

Homestake, South Dakota, 25 cents per share, $31,250; payable March 25.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 15, 1898.

600,606.—TILE ROOFING—J. C. Bayer, Portland, Or.
600,635.—QUARTZ MILL—Crain & Forbes, Plymouth, Cal.
600,576.—PISTON PACKING—H. Dods, Virginia, Nev.
600,579.—GOLD SEPARATOR—Fulcher & Latta, Stockton, Cal.
600,723.—ROTARY ENGINE—P. J. Johnson, Los Angeles, Cal.
600,832.—LEVEES—Jordan & Duncan, S. F.
600,647.—COT BED—H. C. Niemeyer, Wheatland, Cal.
600,821.—STOVES—W. H. Reiss, S. F.
600,623.—HARNESS BUCKLE—G. Shoenberger, Long Beach, Cal.
600,756.—SPIRIT LEVEL—A. Volswinkler, S. F.
600,815.—NECKTIE HOLDER—D. D. Wadsworth, Escondido, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey. Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Books Received.

"A Textbook on Roofs and Bridges—Part IV—Higher Structures," by Profs. Merriman and Jacoby, quarto, 276 pp., Jno. Wiley & Sons, 53 E. Tenth St., New York City; price, $2.50: The fourth of a valuable series, constituting an elaborate treatise on the building of roofs and bridges. Part IV discusses the minutiæ of construction of structures which have more than two supports—continuous, draw and cantilever bridges—with practical illustrative examples. It is observed that the term "kip" is used in this book to denote 1000 lbs. The etymological argument is that as 1000 grains is a kilogram, 1000 lbs. may be called a kilopound, abbreviated into "kip."

A Thoroughly Experienced Mill and Mining Man would like position in Mexico. Speaks Spanish. Is accustomed to Spanish countries. Twenty-five years' experience. Best of references given. Address H., this office.

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WANTED.
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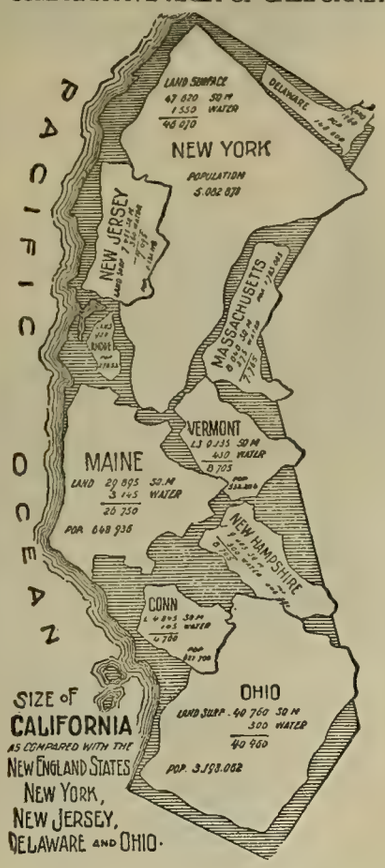
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COMPARATIVE AREA OF CALIFORNIA



COMPARATIVE AREA MAP OF CALIFORNIA

In addition to what the above object lesson conveys to the eye, it might not be irrelevant to state that California occupies a stretch of country on the Pacific Coast that corresponds in latitude with that portion of the Atlantic Coast bounded on the north by Plymouth Bay, in the State of Massachusetts, and by Savannah, Ga., on the south

TOPOGRAPHY OF CALIFORNIA

CALIFORNIA has two great mountain ranges running north and south, parallel to the Pacific Ocean, and extending from the northern extremity of the State two-thirds of the way to the southern end. The one on the eastern border of the State is the Sierra Nevada; that on the western, abutting upon the ocean, the Coast Range. These two ranges meet at their northern and southern ends, and thus enclose the great interior basin, which, 450 miles long and 50 miles wide, comprises, with the contiguous foot-hill region, the bulk of the arable lands of the State.

The southern meeting point of the ranges is Tehachapi Pass. South of the Pass are numerous minor ranges, which have a general easterly and westerly trend. The principal of these is the Sierra Madre, north of Los Angeles, and the San Bernardino Range, east of Los Angeles.

The great basin north of Tehachapi Pass is drained by two principal rivers, the Sacramento in the northern end, flowing south, and the San Joaquin in the southern end, flowing north. These meet midway in the great basin, and as a single stream, flow westward through a break in the Coast Range, emptying into the Bay of San Francisco, and thence reaching the ocean through the Golden Gate. These two rivers are perennial, and are navigable as far as Marysville on the north and Stockton on the South.

The rivers in the southern part of the State are mainly torrential, not navigable, and, with the exception of the Santa Ana, which irrigates the orange groves of the Riverside region, are dry in summer.

The Klamath River, in the northern end of the State, is the only stream of consequence, besides the combined Sacramento and San Joaquin Rivers, that breaks through the Coast Ranges and empties into the ocean.

Many of the most picturesque and highly developed regions are the minor valleys distributed through the Coast Range. Principal among these are the wine and fruit valleys of Santa Clara, Sonoma, and Napa; and in the southern part of the State, the Ojai, San Gabriel, and Santa Ana.

California has a frontage of more than 700 miles on the Pacific Ocean; yet, although its variety is remarkable, and its picturesqueness alluring, it is one of the spectacular features that is hardly ever heard of by the traveler, by reason of the fact that it has been made accessible at very few points by regular lines of travel.

The coast generally abounds in bold headlands and promontories, not unlike the western coast of Scotland in ruggedness, and, in its seaward aspect, presenting a high breast to a foaming, thundering sea.

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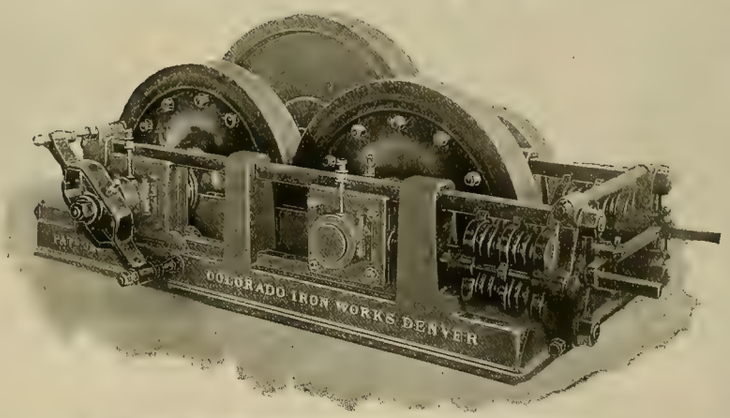
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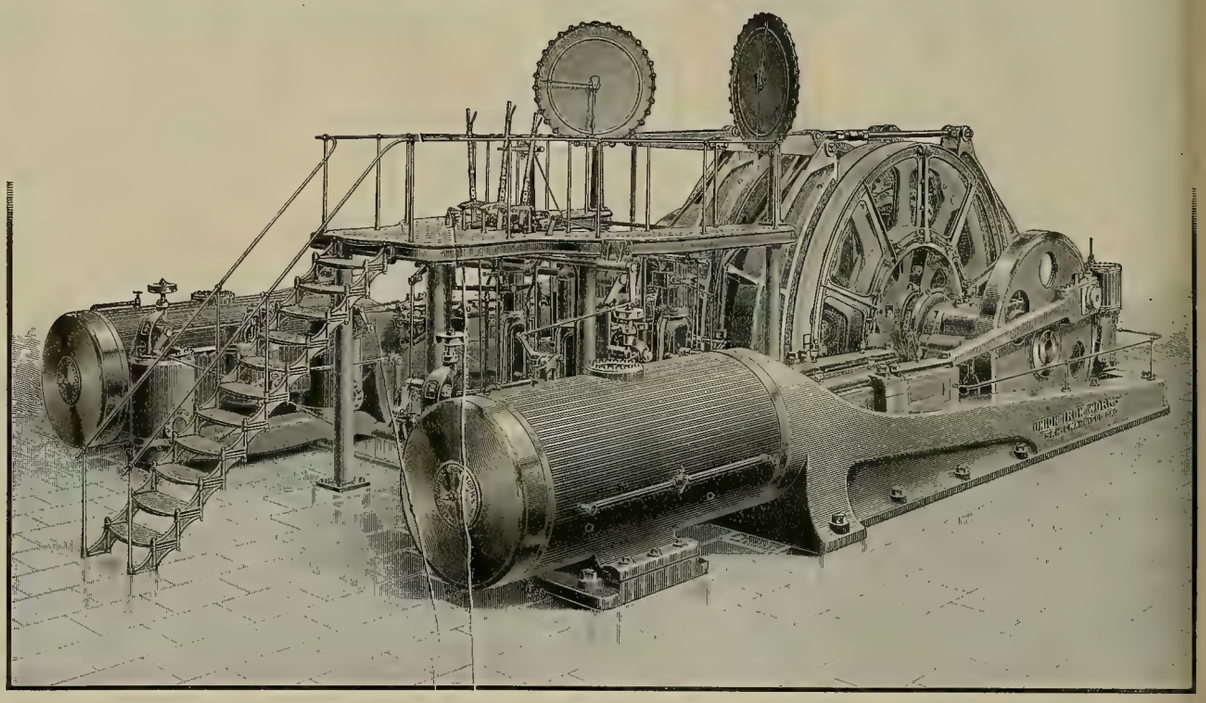
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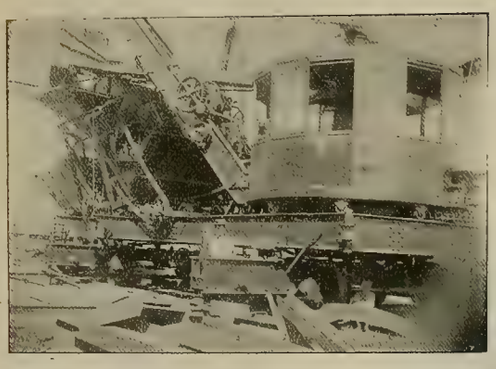
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Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
1...	2500	2 to 4	25 to 150	150 tons	Single operating plant
2...	5000	2 to 3	50 to 300	200 tons	Duplex operating plant
3...	7500	2 to 2½	75 to 450	300 tons	Triplex operating plant

SWAMP AND RIVER-BED PLANTS.

Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
4...	2500	2 to 4	Barge	250 tons	Single amalgamator
5...	5000	2 to 3	Barge	325 tons	Duplex amalgamator

In general terms it may be said these plants consist of the electrically operated dredge and amalgamator, mounted either on steel barges for swamp or river-bed mining, or steel-bodied cars for "gulch," "bar" and "hill diggings," together with the necessary power plants for their operation. Several operating plants, either in close proximity or scattered over a large district, may be operated from a single power station, which may be situated at any convenient point within a radius of a few miles, at railroad depot or where water power can be utilized. The river plants, complete in themselves (each barge containing its own power), are made single or duplex; any suitable number of either can be operated on a river, each independently working its allotted section from surface to bedrock, and rim-rock to rim-rock. All these plants are built with a view to easy transportation, in "knock-down" shape over ordinary mountain roads, and, on special order, the size and weight of separate parts may be still further reduced. In the foregoing table the figure representing the smaller quantity of water required applies to cases where, for any reason, it is desirable or necessary to use the water over and over. The water required may be taken from below the placer, thus obviating the necessity of long ditches, etc. Since these plants neatly pile their debris on the cleaned-up bedrock of the ground worked, they may be said to create their own dump, and hence are enabled to successfully operate on flat ground, or where ordinary dumping facilities are lacking. This peculiarity also renders them independent of "debris laws." The wonderful perfection with which these plants extract the finest, microscopic particles, such as are held in suspension in water, or, when dry, ascend in a gentle current of air, constituting in bulk a perfectly impalpable powder (send for samples), renders them particularly valuable and indispensable in cases where, owing to the fineness of the golden particles, very rich mines are unavailable for profitable working by the hydraulic or sluice processes.

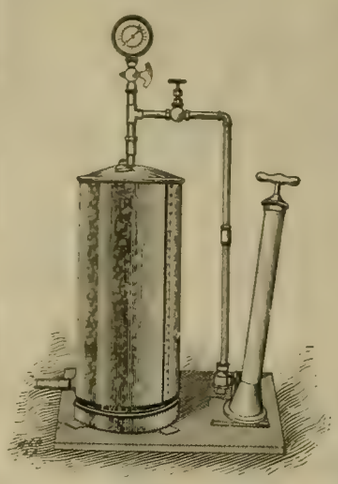
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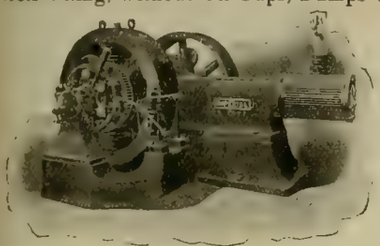
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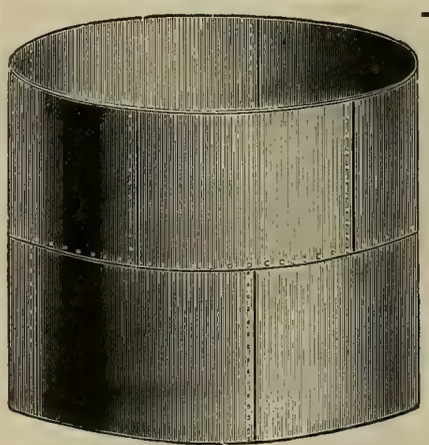
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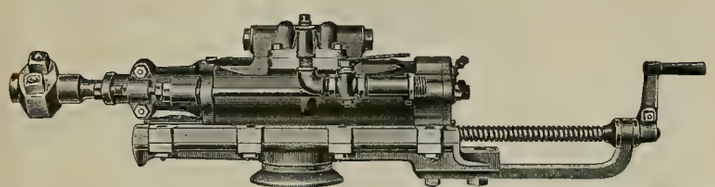
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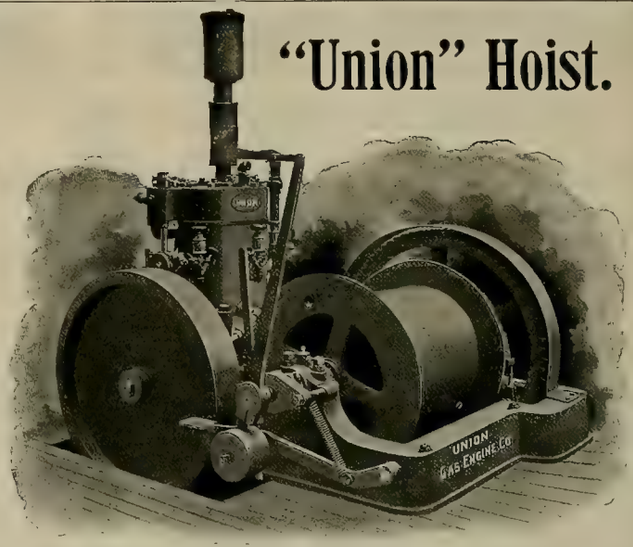
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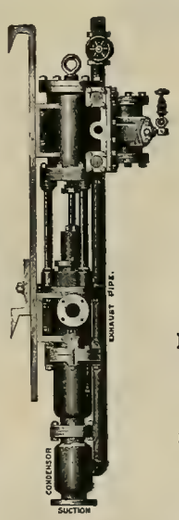
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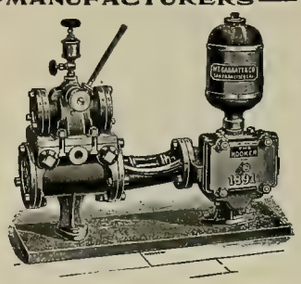
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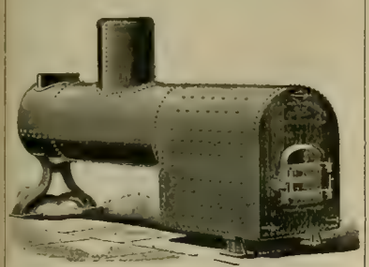
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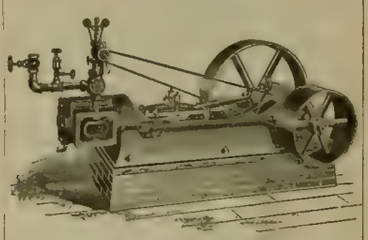
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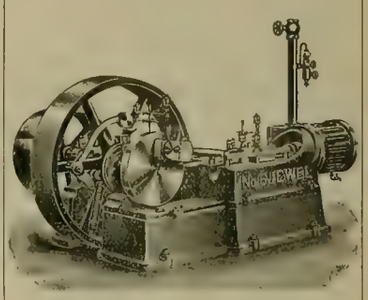
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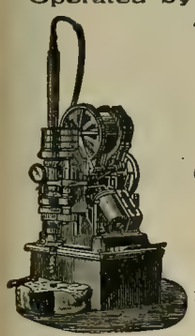


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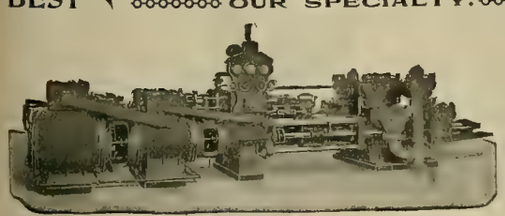
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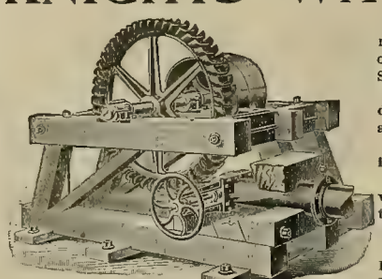


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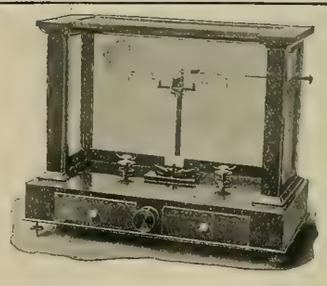
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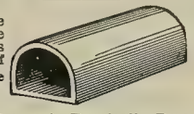


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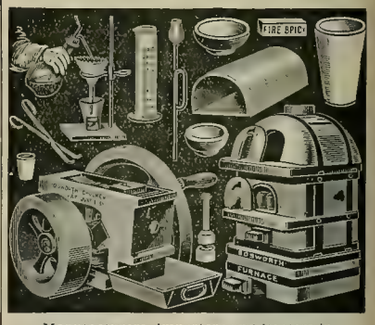
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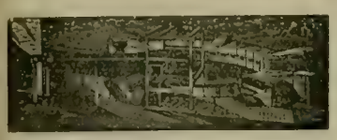
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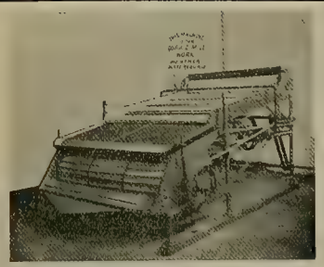
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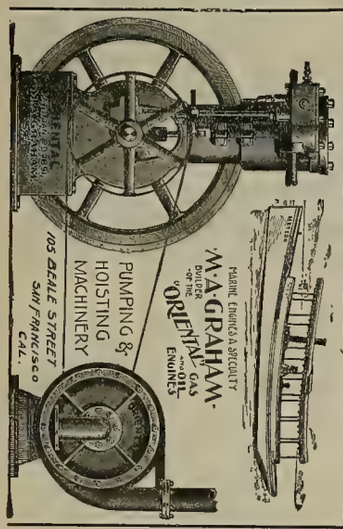
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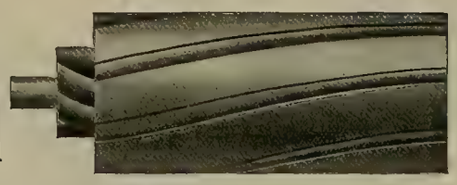
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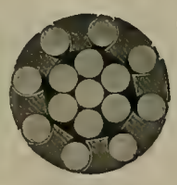
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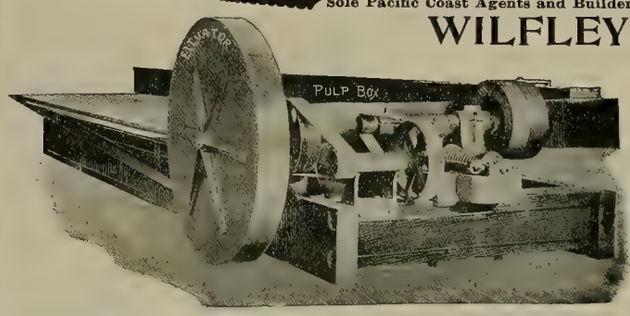
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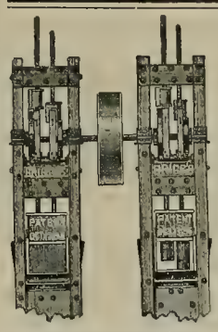


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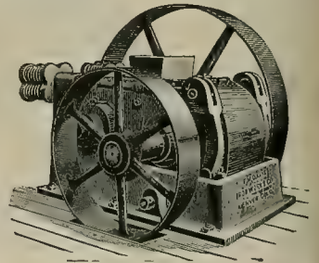


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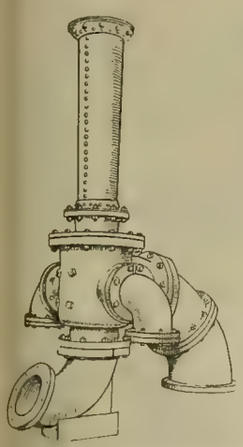
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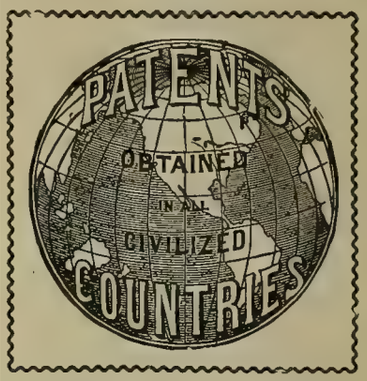
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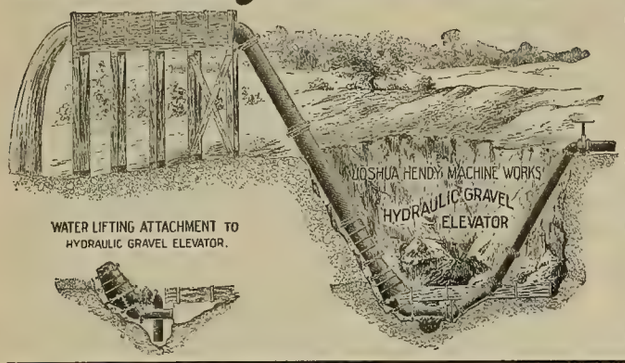
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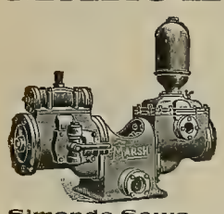
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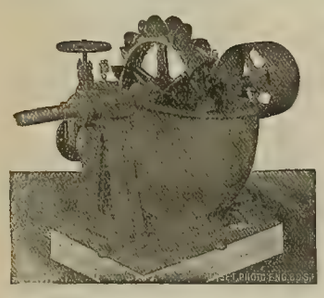
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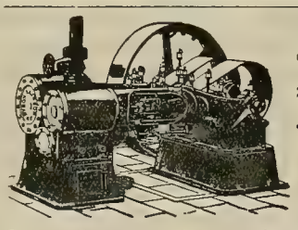
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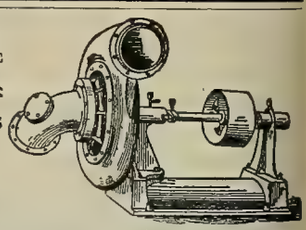
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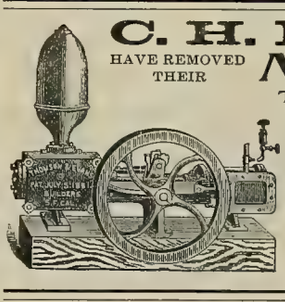
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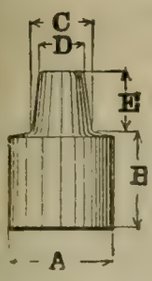
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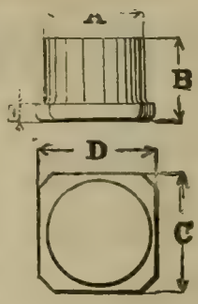
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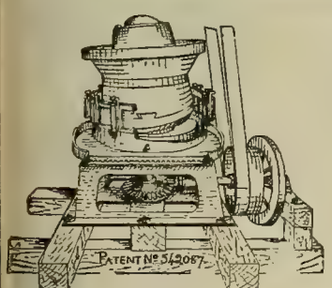
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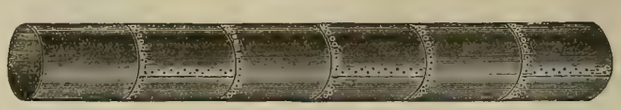
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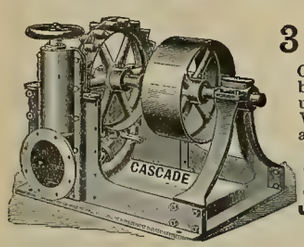
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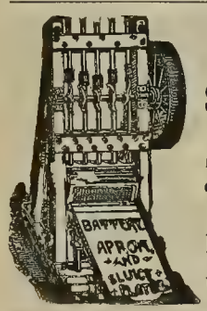




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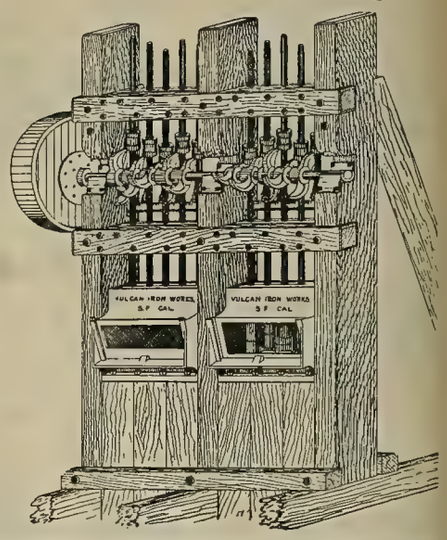
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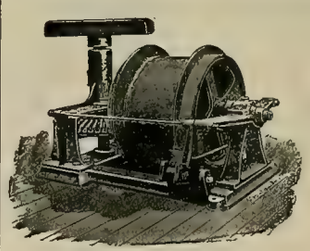
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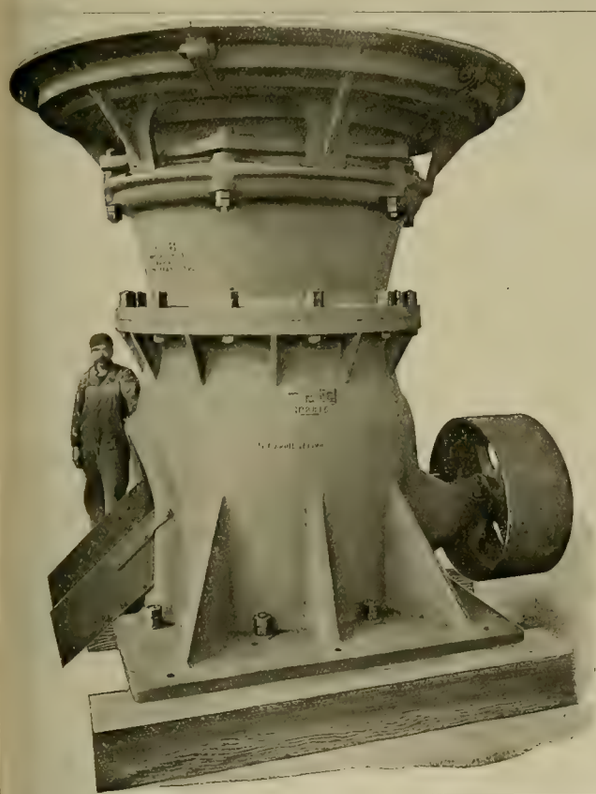
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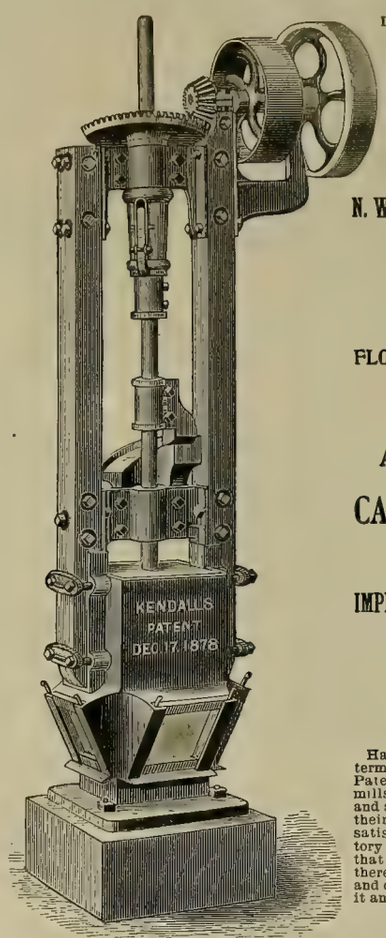
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Market Reports.

The Markets.

SAN FRANCISCO, March 24, 1898.

Jobbers report a good distributive demand in almost all lines, particularly in the necessities of life. There is a fair call from outfitters for Alaska and Northwest Territory, but it is considerably less than had been expected by the trade. With the opening of the Yukon a free call for goods is expected to set in. The outfitting by Alaska canneries is quite heavy, which is making itself felt. A continuance of dry weather with a very light deposit of snow on the mountain ranges create considerable uneasiness not only in agricultural sections but also in mining districts. The call for goods from leading points in Washington, it is said, shows a decided increase over former years. This improvement is due to large purchases there by outfitters for the gold fields in Alaska and the British Territory. Notwithstanding the general unfavorable situation here, manufacturers, as a rule, report more orders in hand than at the corresponding time last year, while trade unions report fewer idle men. Ship and steamboat building gives employment to an increased force as does the Government in making war preparations. From all we can learn the Government will increase its force of workmen still more when plans for prospective works have been fully matured.

The local money market is practically unchanged. A light demand is reported, while the supply of funds in bank is large. Unless there is generous and well distributed rainfalls soon, the demand for funds will be light throughout the year. The rates for exchange on New York are fairly steady. The inquiry for mining property is light, although several sales are pending. The *Wall Street Journal* of March 27 states that the gold imports from Feb. 25 aggregate $30,850,000. This includes $5,500,000 from Australia. This heavy importation has not had any material effect on the New York money market, for the bulk went to other financial centers. The Eastern money markets appear to be more or less disturbed by war scare. While everything points to peace, still there are three points of uncertainty: First—The report of the Board of Inquiry on the Maine disaster. Second—The stand of the President on it and the uncertainty how Congress will receive it. Third—The Spanish elections. If the Weylerites get a good working majority, then it means aggression; but if the other side are victorious, then it means peace. With warlike preparations in the meantime, the money market and speculation is kept feverish.

New York Silver Prices.

NEW YORK, March 24.—Following are the closing prices for the week:

	Silver in— London.	N. Y.
Friday	25¼	55
Saturday	25 9-16	55¼
Monday	25⅝	55⅝
Tuesday	25⅞	55⅝
Wednesday	26	56
Thursday	26 1-16	56

	Copper.	Lead.	Iron.	Tin.
Fri.	11 87½@12 00	3 70	9 75@12 00	14 25
Sat.	11 87½@12 00	3 70	9 75@12 00	14 25
Mon.	11 87½@12 00	3 72½	9 75@12 00	14 30
Tue.	11 87½@12 00	3 75	9 75@12 00	14 35
Wed.	11 87½@12 00	3 75	9 75@12 00	14 40
Thur.	11 87½@12 00	3 75	9 75@12 00	14 40

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.82
London Merchants	$4.81
London Sight Bankers	$4.85
Refined Silver, peroz. 1000 fine	56
Mexican Dollars nominal	45½@46½

SILVER.—Contrary to recent moves, London inaugurated the up-move of the past week, causing New York to respond. This creates the impression that the call abroad is chiefly from India for crop-moving purposes. It also indicates that India has not increased its import duty on the white metal. If crop advices from that country are correct, it is reasonably certain that the importation of silver will be on a more liberal scale than for fully half a decade, which, if events prove to be correct, will cause a much better price for silver before April passes. The crops in India of everything grown are very large, with rice and tea the largest in its history. Our New York advices do not indicate any selling pressure. China is taking very little.

MEXICAN DOLLARS.—The market is very quiet with prices entirely nominal.

COPPER.—The market at home and abroad has held very steady, with European markets showing great strength in the face of recent heavy purchases. The imports into Europe for the first two months of the calendar year are the largest on record during the corresponding months. The varied uses for which copper is used and the increasing consumption in each branch keep stocks down, notwithstanding the increased production. Our New York advices state: "There is superficial evidence of larger business and increased demand, particularly for export account. No particulars as to dealings were made public, but significance was attached to the fact that prices are still very strong all along the line, despite heavy production and the nearness of the opening of navigation, and that the European market steadily hardens.

Our market is quoted as follows:

Ingot casting, jobbing	13¼@—
Ingot " wholesale	13 @—
Sheet copper	16¾@—
Bolt	¼ and 5-16, 20c; ⅜ and larger, 16¼

TIN.—The market for ingot holds strong both here and at the East. The strengthening in silver favors holders of Strait. Tin plate is demoralized under cutting at the East. It looks as if the large manufacturers are trying to drive the smaller out of business. There is a good demand in this city for can manufacture.

The market is quoted in jobbing lots as follows:

Pig	4 75 @ 5 00
Sheet	@ 6 50
Pipe	5 30 @ 5 80

LEAD.—The market has stiffened slightly at the East under an improved demand. Ours is unchanged.

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, "	4 00@—

SHOT.—Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, "	1 60
Buck, Balls and Chilled, do, "	1 60

QUICKSILVER.—The market is quiet. Exports the past week included 135 flasks for Central America.

Our market is quoted at $40 for domestic consumption and $36@37 for export to the west coast of Mexico.

IRON.—The production of pig in this country is very heavy which causes irregular markets at the East. Our market is fairly steady.

COAL.—The market is steady for all grades. The tonnage to load and on the way from Australia is placed at 160,000 tons. It is thought that our market will not do better later on unless crop prospects improved. The consumption is about normal.

Receipts of coal for the week ending with Tuesday were as follows in tons: Puget Sound 14,534; Departure Bay 4594; Swansea 2187; Nanaimo 4265; Coos Bay 1030. Total 16,610 tons.

POWDER.—The market is firm, with a good demand for mining purposes.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

PLATINUM.—The market is steady. Our market is quoted in a jobbing way at $16 per ounce and for scrap $11 per ounce.

ZINC.—The market is steady. Our market is quoted at 10@15c, according to thickness.

ALUMINUM.—The market is steady. We quote in jobbing lots at 45@50c per pound for ingots.

BORAX.—The market is strong, with the East calling for increased quantities.

The market is quoted as follows:

Refined, in carload lots, in barrels	7¼
Refined, in carload lots in sacks	7
Powdered, in car lots, in barrels	7¼
Concentrated, " in sacks	6¾

Chemicals.

Our market is practically unchanged, although there is a firmer feeling for vitriol and crude saltpetre. The consumption of the latter in this country is very heavy, which is depleting supplies quite fast. The East reports the markets as fairly active in about all lines, but with no material change in anything quoted by us.

CYANIDE OF POTASSIUM.—The market is steady. Our market is quoted for chemical pure, 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The market is firm. We quote in a jobbing way at 1½c per lb for 66°.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

ACETIC ACID.—The market is firm at 6 to 12c per pound from store for carboys, according to make.

BONEASH.—There is a fair home and export demand. Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is strong, with first hands asking more money.

We quote in a jobbing way at 4c per pound.

SPELTER.—The market is quiet but firm. We quote our market in a jobbing way at 5c per pound.

BISMUTH.—The market is firm.

Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (Le Blanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70@75c per pound.

Mining Share Market.

SAN FRANCISCO, March 24, 1898.

A feature of the market was an advance in Sierra Nevada to $1.75 the past week under crossorders, a few shorts filling and some outside buying by speculative brokers and others. These transactions caused a spirited advance, but it gave way when some boom traders tried to put out a line at the advance. The decline was helped by the manipulator by orders to two or three brokers. The decline in Sierra Nevada caused a weakening in the whole list. A few years ago, or before the moneyed public was weaned from the game by no dividends but plenty of assessments, the present showing in Sierra Nevada would have caused the shares to sell at over $10 a share, and the entire list to sell at much better figures than they do now. There is no doubt that the way in which the market and several of the mines have been handled for several years past by the reported mill ring and moneyed inside pool has disgusted outside moneyed traders and financially stranded those that continued to play at the game. It has been heads you lose and tails I win on the part of the former, and, unless the tactics are changed, it will be hard to make more than little deals of from 25 cents to over $1 in one or more of the shares. There is a prevailing belief that the ore found in Sierra Nevada is of larger extent and more valuable than reported, yet fears are expressed that outsiders who hold for a big thing will get assessments only for their investment. It is to be hoped for the sake of the industry that these fears are groundless. Towards the middle of April work ought to be far enough advanced to exploit more advantageously the ore found in that mine and quite an increase in the ore output be reported each week. While the work in several of the mines is said to be quite important, yet the way in which it is being prosecuted, and some still more important not being started, give the impression that it will carry it into the fall months before anything very good will be reported officially which will have the effect of advancing the market value of shares. Private advices from Con. Virginia state that the mine is looking very well, and they are in position whenever the order comes to start important work which it is thought would change the complexion for the better. In Chollar they have a fairly good prospect. In Potosi and Bullion they are working to make connection with the old Crœsus shaft and the long west crossdrift that was run by Bullion. The showing in both Justice and Alta is said to be quite promising, but the trading public take little interest in them. In Occidental the showing is good, but it looks as if it will take some time before they are ready for more extensive exploiting. Standard ought to be in position to resume regular monthly dividends.

From the Comstock mines official letters are largely a rehashing of letters filed every week for many weeks past. The only difference in them is a kill-time change of work reported every few weeks; but the distances run by and material encountered in most of the mines have a monotonous sameness. In Utah they are still going in a northwesterly direction. The material passed through is unchanged. In Andes they are running a west crossdrift on the 175-foot level. In Sierra Nevada, owing to the dip of the ore, the upraise is out of ore. When connection is made above, then it is expected active exploiting will be resumed. There was raised the past week sixty-five tons of ore assaying, as per sample, $40 in gold and twenty-one ounces in silver to the ton. Fair progress is being made in the north lateral drift on the 900-foot level. No change in material is reported. They are making about 20 feet a week in the west crossdrift on the 900-foot level in Union. Nothing important is reported. In Mexican they are still going east on the 1000-foot level. In Ophir they are still crossdrifting to the west on the 1000-foot level and on the Central tunnel level. If they would use the drill the management would disabuse the public of the belief that they are trying to freeze them out. No new work, so far as the official letter goes, has been started in Con. Virginia. Active work is being done on and around the 1550-foot, 1650-foot and 1750-foot levels. No important results are looked for now before next winter, unless the share market works into better position, but this can be said about all of the mines. The joint work of Best & Belcher and Gould & Curry is the same as reported last week. In Savage no change is reported. They are running for the ore found in Chollar. In Chollar they are following the 4-foot ore found in the 100-foot level. They extract a few tons of ore each week. They are running a west crossdrift on the surface tunnel level to strike the downward continuation of the ore. Fair progress is being made in repairing the main incline. The joint work of Potosi and Bullion is confined to the south drift and repairing the old Crœsus shaft. In Alpha they are running a west crossdrift. They have extracted a few tons of low-grade ore. The work in Con. Imperial is confined to the long west drift. In the joint Challenge, Confidence and Con. Imperial west crossdrift a strong flow of water is still reported. This drift will drain a large area to the west and, if not stopped, will tap the west lode, which is gold-bearing and gives high assays. From Yellow Jacket no news is reported officially. It is said that the important work which was to be started is said to be delayed. The work in Crown Point, Belcher and Seg. Belcher is practically the same as reported last week. The work in Caledonia is reported on the 1100-foot level. From Justice no change is reported. The superintendent of Alta reports that they are extracting about four tons of ore a day, assaying about $38 to the ton. "The ore found in the east crosscut is 18 inches wide and getting wider to the north. It assays from $31 to $42 to the ton."

On the Brunswick lode interest begins to center largely on the proposed work by Gould & Curry on the Comstock tunnel. They intend taking up the drift run to the north in Savage where $40 ore was struck, extend it in their ground and explore that level thoroughly. Mining men are quite confident that quite a body of paying ore will be struck and and if so there will be renewed interest in the mines on that lode. Best & Belcher, Con. Virginia and Gould & Curry are still sinking the incline shaft and at the same time they are running a south drift on the 600-foot level. No change is reported from Savage. In Chollar the work is largely repairing throughout the mine. Main incline shaft No. 1 is being sunk about 16 feet a week. The general situation in Potosi is unchanged. No change is reported in the work outside of their having resumed work in the south drift on the 600-foot level. The showing in Occidental continues favorable, but it will take considerable time to develop the ore found. Work on the different levels is about the same as reported last week.

The following illustrates the changes of the week:

Mines.	Mar. 17.	Mar. 24.
Alpha		
Alta Consolidated	$ 16	
Andes	12	
Belcher	26	
Best & Belcher	33	$ 31
Bodie		
Bullion		
Challenge	30	
Chollar	47	48
Confidence	73	
Consolidated California and Virginia	79	79
Consolidated New York		
Crown Point	15	
Exchequer	06	
Gould & Curry	22	19
Hale & Norcross		
Justice		
Mexican	32	
Ophir	44	44
Overman	11	
Potosi	44	40
Savage		
Sierra Nevada	1 30	1 55
Union	40	41
Utah	10	
Yellow Jacket	29	

San Francisco Stock Board Sales.

SAN FRANCISCO, March 24, 1898.

9:30 A. M. SESSION.

100 Best & Belcher	31	150 Potosi	40
200 Con Cal & Va	79	200 Sierra Nevada	1 50
200 Gould & Curry	19	300 Standard	1 70

SECOND SESSION—2:30 P. M.

550 Ophir	44	300 Sierra Nevada	1 55
90 Con Cal & Va	79	200 Occidental	2 65
100 Chollar	48	100 Union	41
200 Potosi	40		

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Company and Location.	No.	Amt.	Levied, Delinq't and Sale.	Secretary.
Alpha Con M & M Co, Nev	20	5c	Feb 1..Mar 8..Mar 29	C E Elliot, 309 Montgomery
Andes S M Co, Nev	45	5c	Mar 7..Apr 11..Apr 28	John W Twiggs, Nevada Block
Baliol G M Co, Cal	2	30c	Jan 26..Mar 25..Apr 18	R L Cheney, Mills Building
Best & Belcher M Co. Nev	64	20c	Mar 8..Apr 12..May 3	M Jaffe, 309 Montgomery
Church G M Co, Cal	1	3c	Mar 23..Apr 29..May 23	A P Swain, 309 Montgomery
Con Cal & Va M Co, Nev	11	25c	Mar 8..Apr 13..May 3	A W Havens, 309 Montgomery
Con Imp M Co, Nev	40	1c	Mar 1..Apr 5..Apr 26	C L McCoy, Mills Building
Con St Gothard G M Co, Cal	13	15c	Mar 10..Apr 19..May 11	J F Holling, Crocker Building
Crown Point G & S M Co, Nev.	73	10c	Feb 21..Mar 28..Apr 18	Jas Newlands, Mills Building
Fall River Con G Q Co, Cal	11	5c	Jan 15..Feb 25..Apr 21	A Lorsbach. 313-315 Front
Gould & Curry S M Co, Nev	83	15c	Mar 16..Apr 19..May 10	A K Durbrow, 309 Montgomery
Kate Hayes M Co, Cal	6	$1	Feb 25..Apr 5..Apr 26	H Pichoir, 320 Sansome
Marguerite G M & M Co, Cal	9	10c	Feb 19..Apr 6..May 2	F Mettmann, 325 Sansome
Marina Marsicano G M Co, Cal	13	9c	Mar 5..Apr 11..May 2	Charles Bovone, 217 Sacramento
N Bloomfield Gravel M Co, Cal	50	25c	Feb 25..Apr 6..Apr 27	H Pichoir, 320 Sansome
Occident l Con M Co, Nev	30	10c	Mar 9..Apr 12..May 4	A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	72	25c	Feb 24..Mar 29..Apr 18	E B Holmes, 309 Montgomery
Orleans M Co, Cal	7	10c	Feb 1 Mar 8..Mar 28	Geo O Thurston, 575 Mission
Potosi M Co, Nev	49	20c	Feb 5..Mar 11..Apr 4	C E Elliot, 309 Montgomery
Richmond G M Co, Cal	2	1c	Mar 2..Apr 9..May 2	L R Tuttle, 328 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19..Feb 26..Apr 4	A F Frey, Phelan Building
Tuber M Co, Cal	1	50c	Mar 22..May 3..June 2	J W Pew, 310 Pine

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Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 29-30 Chronicle Building, S. F.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from John E. Burton, in the Green Mountain Mine near Mokelumne Hill, Calaveras Co., to deposit tailings in Chili Gulch; from the Harville Mining Co., in the Harville Mine near Placerville, El Dorado Co., to deposit tailings in Martinez Creek; from A. B. Jacks, in the Badger Hill Mine near Spanish Ranch, Plumas Co., to deposit tailings in Spanish Creek; and from the Star of Plumas Water and Mining Co., in the Star of Plumas Placer Mine near Buck's Ranch, Plumas Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on March 28, 1898, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Wm. Nolden and C. Kaber, in the Aureole mine, near Oleta, Amador county, to deposit tailings in Deadman creek, and from George Beattie, in the Beattie mine, at Georgia Slide, El Dorado county, to deposit tailings behind the dam of the Gold Bug mine, in Canyon creek, gives notice that a meeting will be held at room 59, Flood building, on April 11, 1898, at 1:30 P. M.

Rainfall and Temperature.

The following data for the week ending 5 A. M., March 23, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Minimum Temperature for the Week	Maximum Temperature for the Week
Eureka	0.18	28 23	43 09	36 53	30	52
Red Bluff	0.00	12 08	22 71	21 17	30	60
Sacramento	0.00	8 55	15 81	16.69	30	62
San Francisco	0.03	7 52	20.86	19 62	40	59
Fresno	0.01	3.71	9 97	8 16	30	64
San Luis Obispo	0.08	5.45	20 11	....	28	64
Los Angeles	0.22	5 02	16 46	14 62	36	64
San Diego	0.16	3 82	11.60	9 12	40	60
Yuma	0 00	1 65	5.35	2 87	38	72

Assessment Notices.

CHURCH GOLD MINING COMPANY.—LOCATION of principal place of business San Francisco California; location of works, El Dorado, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 23d day of March, 1898 an assessment (No 1) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary at the office of the company, room 15, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 29th day of April, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 23d day of May, 1898, to pay the delinquent assessment together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. P. SWAIN, Acting Secretary.

Office—Room 15, Nevada block, San Francisco, California.

CONSOLIDATED ST. GOTHARD GOLD MINING Company.—Location of principal place of business, 113 Crocker building, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of March, 1898, an assessment (No. 13) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker building, sixth floor, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. F. HOLLING, Secretary.

Office—113 Crocker building, sixth floor, San Francisco, California.

NORTH BLOOMFIELD GRAVEL MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North Bloomfield, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 25th day of Feeruary, 1898, an assessment (No. 50) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on WEDNESDAY, the 27th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

RICHMOND GOLD MINING COMPANY.—Location of principal place of business San Francisco, California; location of works, Butte County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of March, 1898, an assessment (No. 2) of 1 cent per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 406, No. 328 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of April, 1898 will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

L. R. TUTTLE, Secretary.

Office—Room 406, No. 328 Montgomery street, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of March, 1898, an assessment (No. 45) of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 28th day of April, 1898, at 11 A. M., to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Room 22, Nevada block, San Francisco, California.

TUBER MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California. location of works, Panamint district, Inyo county, California

Notice is hereby given that, at a meeting of the Board of Directors, held on the 22d day of March, 1898 an assessment (No. 1) of fifty (50) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of May, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before will be sold on THURSDAY, the 2d day of June, 1898, to pay the delinquent assessment, together with the costs costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of March, 1898, an assessment (No. 13) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary

Office—217 Sacramento street, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of March, 1897, an assessment (No. 83) of 15 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 61, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of April, 1898, shall be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 10th day of May, 1898, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 61, Nevada block, No. 309 Montgomery street, San Francisco, California.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of February, 1898, an assessment (No. 6) of one dollar ($1) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 26th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of February, 1898, an assessment (No. 9) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 1 to 4 P. M. at his business office, 223 Sansome street.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

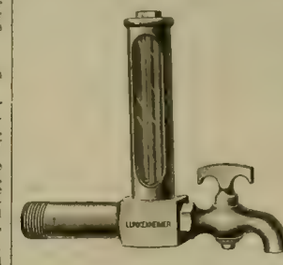
By order of the Board of Directors, the day of delinquence in the above assessment notice has been postponed to March 12th, 1898, and the day of sale to MONDAY, April 4th, 1898.

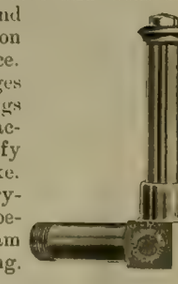
A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

·Lunkenheimer's·
OIL GAUGES

Are made in two styles, with and without Drain Valve and with and without Shield. Simple and practical in construction and neat in appearance. We can also furnish gauges made according to drawings and specifications. Satisfaction guaranteed. Specify "Lunkenheimer" make. Supplied by dealers everywhere. Catalogue of superior brass and iron steam specialties free for the asking.





THE LUNKENHEIMER CO., Cincinnati, Ohio, U. S. A.,
SOLE MANUFACTURERS,
26 Cortlandt St., NEW YORK. ✦ BRANCHES: ✦ 35 Great Dover St., LONDON, S. E.

WEBER Gasoline Hoists

In Use UNDER GROUND And ON THE DUMP From British Columbia To South Africa And THEY DO GOOD WORK.

Form No. B. MINAS TEPEZALANAS No. of mules allowed, eight
DE
LA GRAN FUNDICION CENTRAL MEXICANA.
DE
AGUASCALIENTES, ESTADO DE AGUASCALIENTES
EDWARD DOBRR, Superintendente
Tepezalá, S. de A. C. 12/17 1897

The Weber Gas Engine Co.
Kansas City Mo

Gentlemen:— In reply to yours of 6th inst to Mr. Geo. D. Barron. Your 10 H.P. gasoline hoist has been installed underground at this hacienda and is hoisting from a 190 ft. winze. The present dump on the hoist is 40 buckets of 65 each, per skip. When necessary this can be increased as the actual time consumed for round trip, together with the dumping of bucket is but three minutes. The consumption of gasoline is 3 gallons daily. The winze has a dip of 65° and hoisting is done by means of bucket on skids, thus creating considerable friction.

Yours very truly
Edward Dobrr Supt.

RECEIVED
DEC 24 1897
Ans'd 12/24
WEBER G. & G. E. CO.

WEBER Gas and Gasoline Engine Co.,
430 S. W. Boulevard.....KANSAS CITY, MO.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey county, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the eighth (8th) day of March, 1898, an assessment (No. 64) of twenty cents (20c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twelfth (12th) day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the third (3d) day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada Block, No. 309 Montgomery street, San Francisco, California.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of March, 1898, an assessment (No. 11) of 25 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 59, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 59, Nevada block, San Francisco, California.

NOTICE OF ANNUAL MEETING.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Principal place of business, 120 Sutter St., San Francisco, California; works, in Old Diggings Mining District, Shasta County, California.

In accordance with the by-laws of said company, the annual meeting of the stockholders of the Mammoth Garfield Gold Mining Company will be held at the office of the company, rooms 50 and 54, 120 Sutter St., San Francisco, California, at 2 P. M., on Tuesday, the 5th day of April, 1898.

SAM. W. CHEYNEY, Secretary.

Dated March 14th, 1898.

DELINQUENT SALE NOTICE.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 9) levied on the 19th day of January, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Elizabeth A Bassett	358	860	20 00
Elizabeth A Bassett	359	800	20 00
Elizabeth A. Bassett	360	512	12 80
Elizabeth A. Bassett	361	308	7 70
Maggie Bassett	362	800	20 00
Maggie Bassett	363	800	20 00
Maggie Bassett	364	512	12 80
Maggie Bassett	365	308	7 70
A. F. Frey, Trustee	178	4,200	105 00
Wm. H. Schmidt	89	500	12 50
Wm. H. Schmidt	90	500	12 50
Wm. H. Schmidt	91	600	15 00
Wm. H. Schmidt	129	500	12 50
Wm. H. Schmidt	130	500	12 50
Wm. H. Schmidt	131	500	12 50
Wm. H. Schmidt	132	500	12 50
Wm. H. Schmidt	133	512	12 80
Wm. H. Schmidt	134	640	16 00
Wm. H. Schmidt	248	694	17 35
R. Z. Johnson	393	700	17 50

And in accordance with law, and an order from the Board of Directors, made on the 19th day of January, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, room 44, Phelan building, San Francisco, California, on MONDAY, the 4th day of April, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

DELINQUENT SALE NOTICE.

FALL RIVER CONSOLIDATED GOLD QUARTZ Mining Company.—Location of principal place of business, San Francisco, California; location of works, Plumas County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 11) levied on the 15th day of January, 1-98, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
L. Cassel	42	500	25 00
L. Cassel	46	750	37 50
L. Cassel	48	2	10
H. W Brunning	49	1,000	50 00
J. Pilger	61	1,250	62 50
H. Meyer	26	1,111	55 55
H. Meyer	27	1,111	55 55
H. Meyer	28	1,111	55 55

And in accordance with law, and an order from the Board of Directors, made on the 15th day of January, 1898, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, 313 and 315 Front street, San Francisco, California, on THURSDAY, the 21st day of April, 1898, at the hour of 3 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

ADOLPH LORSBACH, Secretary.

Office—313 and 315 Front street, San Francisco, California.

BARGAINS IN DYNAMOS, ENGINES, ETC.

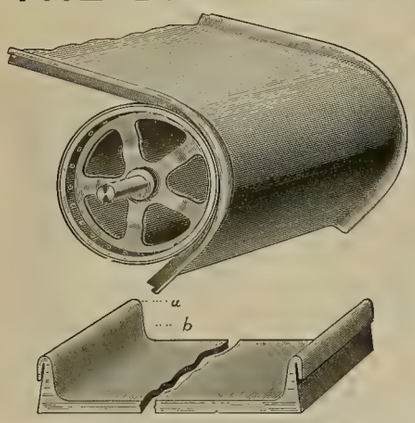
DIRECT CURRENT DYNAMOS of 55, 150, 270, 350, 700, 725, 800, 810, 900, 1075, 1350, 1610 and 2500-light capacity. ALTERNATING CURRENT DYNAMOS of 750, 900, 1200 and 2000-light capacities. ARC DYNAMOS—20, 24, 30, 40, 50 and 60-light, both 1200 and 2000-candle power. ENGINES—12, 50, 75, 85, 100, 115, 125, 150, 175 and 200 H. P. BOILERS—50, 100, 250, 375 and 500 H. P. HEATERS—150, 1000 and 2000 H. P. STEAM PUMPS—All sizes.

SEND FOR OUR PRICE LIST No. 24

Most of this apparatus has been removed from our own central stations to make room for larger units, and is therefore in excellent condition.

CHICAGO EDISON COMPANY, 139 Adams Street, CHICAGO, ILL.

THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

ORIGINAL EMPIRE MILL & MINING COMPANY,
GRASS VALLEY, NEVADA CO., CAL., Feb. 20, 1897.

JAS. S. BROWNELL, ESQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

ROANOKE MINING COMPANY,
MOKELUMNE HILL, March 4, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: We have in our 20-stamp mill at this place five Frue vanners; three of these are equipped with the Patent Lip flange belt and two with the plain flange belt. We certainly consider the former a great improvement on the latter. They will certainly wear much longer, as cracking now seems out of the question. Any one purchasing the Frue vanning machine should see that it is equipped with the Patent Lip flange belt. Very truly yours, ROANOKE MINING COMPANY.
Per G. M. WILDE, Acting Superintendent.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.

(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.

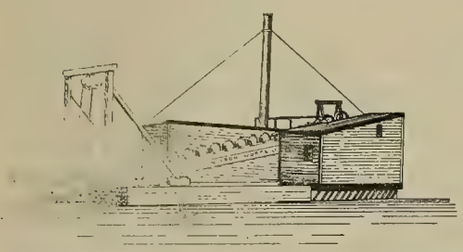
RISDON IRON WORKS,

MANUFACTURERS OF

Gold Dredging Machinery

FOR

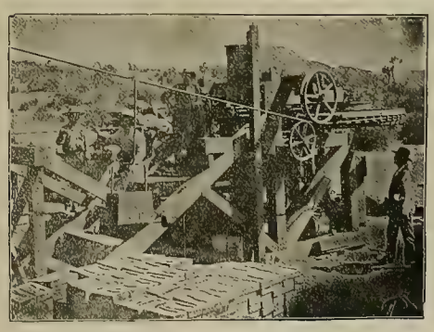
YUKON and KLONDIKE. Our MINING RIVER DREDGE, with self propelling machinery, is just the thing for placer mining in Alaska. SHIPPED KNOCKED DOWN, AND, IF DESIRED, ERECTED IN RUNNING ORDER.



WE ALSO MANUFACTURE ALL KINDS OF

★ ★ MINING AND MILLING MACHINERY, ★ ★
ENGINES AND BOILERS, STERN WHEEL BOATS,
EVANS PAT. HYDRAULIC ELEVATORS AND HYDRAULIC GIANTS,
Water Wheels and Sheet Iron Riveted Pipe.
Hammered Steel Shoes and Dies for Stamp Mills.

Office and Works: **Howard and Beale Streets, S. F., Cal.**



THE HALLIDIE ROPEWAY

Stands pre-eminent for the transportation of Ore, Fuel and other materials over mountainous and rugged country.

Parties desiring to remove large quantities of Sand, Gravel, Earth, Ore, Rock, to construct Dams, Levees or Embankments, etc., can do most efficient work at less cost by the

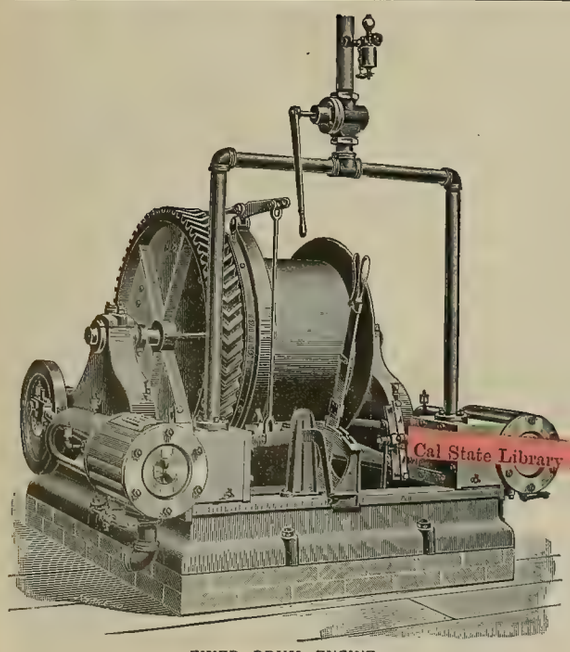
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Than by any other known system.

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Room 610, 330 MARKET ST., - - - SAN FRANCISCO, CAL.



FIXED DRUM ENGINE.

PARKE & LACY CO.,

21 and 23 FREMONT STREET, SAN FRANCISCO, CAL.

Hoisting and Pumping Machinery

...FOR...

MINE PROSPECTING AND DEVELOPMENT.

SOLE AGENT FOR THE

Ingersoll-Sergeant Air Compressors and Rock Drills.

LICENSEE FOR THE MANUFACTURE AND SALE OF THE

Ropp Straight Line Furnace for Roasting, Chlorinating and Desulphurizing Ores.

Huntington Centrifugal Roller Quartz Mill,

Simmons Ball-Bearing Hydraulic Giants, Paul Ball Mill.

WE CARRY IN STOCK

Horizontal, Vertical and Portable Engines and Boilers,
Rock Breakers, Cornish Rolls, Pulverizers, Concentrators, Ore Feeders,
Hoisting Engines, Horse Power Hoisting Whims, Water Wheels, Steam Pumps, Ore Cars, Wire Rope, Ore Buckets, Water Buckets, Skips,
Blowers and Exhaust Fans, Shafting and Pulleys, Belting, Oils and Mine Supplies.

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Estimates Furnished for Complete Plants for Hoisting Works, Smelters, Concentrating and Stamp Mills.

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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 1969.—VOLUME LXXVI. Number 14. SAN FRANCISCO, SATURDAY, APRIL 2, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Utica Mine, California.

The following description of one of California's great gold mines is taken from the Mineral Resources of Calaveras County: The Utica mine, owned by the Hobart estate, is another example of an old abandoned mine made to pay well by systematic development and proper management.

Angels Camp was one of the earliest settlements in the county, but the present prosperous condition of the vicinity is entirely owing to the great work of this company, which in all its surroundings employs over 500 men. There are three claims controlled by the company—the Utica Stickles, upon which there have been erected 120 stamps; the Madison, upon which are forty stamps, and the Gold Cliff which has twenty stamps. A three-compartment shaft has been sunk upon the Stickles to a depth of 1360 feet. It is very difficult to obtain an exact statement of the yield from this mine, but when the plant was running in full blast, before the great fire of last summer, for many months the yield was as high as $200,000 per month.



THE UTICA MINE, CALAVERAS COUNTY, CAL.

Water is used for power and the supply is owned and controlled by the company, the ditch being completed from Alpine county, over sixty miles.

When the business justifies it, an enormous electric power can be generated from present water facilities.

The company operates a large chlorination plant for treating sulphurets, also a cyanide and electric plant.

In the town of Angels there is a remarkable complexity of veins. The main branch of the mother lode can be traced along the hill west and northwest of the town, though it diminishes in size. The serpentine rock of the Madison is replaced northwesterly by an altered diorite.

The shaft of the Utica and Stickles mine starts with vein at the surface, but at a depth of 500 feet the vein takes a somewhat flatter dip, but the shaft continues at the same angle in the foot to the 1360 level.

The stopes of this mineral zone are from 10 to 100 feet wide. The entire gold-bearing zone consists of a great mass of altered diabase, which has been rendered slatey and splintery by pressure, and subsequently altered to chloritic or talcose schist. Large masses of crushed diabase are replaced by solid, massive quartz. Power drills are used, and the average weekly progress in sinking the large shaft has been 35 feet. A great forest of round timbers are used up in the shaft and drifts. All the waste is used in filling up the old stopes, and the absence of the large waste dump is a noticeable and original feature of this mine.

The formation of the Madison is typical of the district, and of the other claims belonging to the Utica Company, and a description of the upper workings will show the general formation. The foot wall is black slate and hanging wall is diorite. One hundred and fifty feet away in the hanging wall there is a decomposed serpentine rock. The hanging wall vein which is more regular, is in some places 8 feet thick. No gouge separates it from the slates, which for some distance are intersected by small veins. The main vein averages 3 feet, with a thin gouge between it and the hanging wall vein. No well-defined foot wall has been reached. The quartz is bunched and quite flat at times. The average dip is 43 degrees northeast. The massive portion of the quartz contains very few sulphurets, the heavy mineralization being on the foot wall side. The free gold is mostly in the hanging wall vein. The slates on either side of the quartz are impregnated with sulphurets, and are worked for some distance in. These thin bands of quartz, alternating with leaf-like talcose strata, form the body of the ribbon-like rock on either side of the main quartz deposits of this claim, and also of the Gold Cliff mine on the north. Its course is about the same as the Madison. The dip is from 60 to 70 degrees northeast. It varies in width from 1 to 4 feet, and is grooved and polished on its upper surface. A small vein having a slight gouge, and a remarkably smooth foot wall, joins this on the foot wall side. The rock milled is the small vein, and the slates and ribbon-like quartz between it and the main ledge, which is not worked. East of it is a small pocket vein. This has no defined hanging wall, and the slates are mineralized and intersected with quartz stringers for some distance.

A VIRGINIA CITY, NEV., miner questions "Is there any more powerful hoisting machinery anywhere than on the Comstock?" In several places, notably Butte, Montana, where two hoisting engines, furnished by the Union Iron Works, have four cylinders, two initial 26″ diameter and two low-pressure 46″ diameter by 72″ stroke. One of these hoisting engines is placed on the Never Sweat shaft of the Anaconda mine, Butte, Mont. This hoist raises ten tons of ore at a load in a skip at the rate of 2500 feet per minute. They use a flat, steel rope 8″ wide by ½″ thick; weight of skip without load is 4800 pounds. In the Red Jacket shaft of the Calumet & Hecla runs a four-deck cage on which is lifted six tons of ore at a rate of 3000 feet per minute. This shaft is now 5000 feet in depth. The largest hoist on the Comstock is on the Union shaft, two cylinders each 28″ diameter by 96″ stroke. Probably the most powerful hoisting machinery on any vertical shaft in California is on the Oneida mine, Amador county, now being sunk to tap the vein at 1750 feet. This hoist is capable of supplying an 80-stamp mill with ore from a depth of 2500 feet.

A SHASTA COUNTY inquirer asks if tellurium has ever been discovered in California and how to determine its presence. Telluride ores occur in northern Tuolumne, southern Calaveras and other sections of the State. Some time ago was published herein the following: Any miner or prospector who has a blow pipe, alcohol lamp and a few drops of cold sulphuric acid can, in a few minutes, determine whether tellurium is present in ores. All that is necessary is to break off a small piece of the ore, place it in a small porcelain dish previously warmed so as to avoid breaking, apply the blow pipe until the ore is at an oxidizing heat, then one or two drops of sulphuric acid on porcelain dish; allow to mix with the ore. The reaction will immediately follow, if tellurium is present, by beautiful carmine and purple colors.

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J. F. HALLORAN.....General Manager

San Francisco, April 2, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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THREE men from Dawson report that twenty tons of gold will be brought from the Yukon this season. They also state that a $9000 nugget has been found. The Boise, Idaho, *Statesman* incredulously thinks that it should be stated what the boomers paid those men to come out from the Klondike at this season to bring this news.

CALIFORNIA Congressmen are confident of the passage at this session of Congress of the original Mineral Lands bill, which has been pending before that body for several years, provided no amendment be attached to it in extending its operations to Oregon. A U. S. Senator from Nevada and a U. S. Senator from Oregon were able to block this measure twice, but it is believed that there is some probability of success this session.

IN a long communication in *Science*, March 18th, '98, S. H. Emmens of New York declares that he is in receipt of a letter from an eminent physicist informing him that after following his (Emmen's) suggestions regarding the transmutation of silver into gold, he had "performed the crucial experiment," and that "the gold contained in a Mexican dollar, after forty hours of intense cold and continued hammering, was found to be 20.9 per cent more than the quantity of gold contained in the same dollar before the test." It is a matter of regret that the eminent physicist did not disclose how much gold was in the Mexican dollar before the forty hours of intense cold and continued hammering.

UNDER date of March 31st, Prof. Perrine furnishes the following from Lick Observatory, on Mt. Hamilton, Cal.: "The heaviest shock of earthquake ever felt on Mt. Hamilton occurred last night at 11:43:20 o'clock. The seismograph shows the vibrations lasted forty seconds, and the approximate motion of the earth was a quarter of an inch. This is an unusually heavy quake, the motion being usually only a few hundredths of an inch. There was no continuous quake of varying intensity. During the first fifteen seconds the vibration was light. After that came the hardest part of the shock, which gradually lessened. The greatest motion was from northeast to southwest."

AT a meeting of the executive committee of the California State Miners' Association on the 28th ult. it was the sense of the meeting regarding the secretaryship of mines and mining that present success in that direction could best be secured by an effort to have created a Commissioner of Mines as a subordinate part of the Department of the Interior. It was decided that due recognition of the importance of the International Miners' Convention (which is to be held at Salt Lake City, Utah, July 6th, 1898) required adequate representation by California miners, and that the Secretary of the California State Miners' Association communicate with the officers of the several county organizations, urging the appointment of representative delegates who would attend.

THE Government administration of the Swedish State railway invites engineers to a competition of designs for the arrangement of new railroad stations, junctions, etc., for the city of Stockholm. The first prize is 12,000 Swedish crowns (about $3230), the second 8000 Swedish crowns (about $2150), the third about 4000 Swedish crowns (about $1075). The time for competition will expire at noon on Aug. 31, 1898. Particulars will be furnished by the Swedish-Norwegian Legation, 2011 Q street, Washington, D. C., or by the Vice Consul of Sweden and Norway, A. Peterson, LeDroit building, corner F and Eighth streets, Washington, D. C. Security to the amount of $13.50 for the use of the drawings in this competition will be required, which will be refunded when the drawings are returned. The Swedish representative, in making this announcement, expresses the hope that American engineers will carry off some of the above prizes.

Two mining cases last month strikingly illustrate the necessity for change in our mining laws, so that well meaning and intelligent judges can render at least approximately correct decisions. The one was the mining suit of E. R. Morse against the Montana Ore Purchasing Co., which was tried in the United States Court. Judge Knowles, who patiently gave attention to the case, plainly stated his inability to feel satisfied with his own decision. The fact that about twenty mining experts testified to contradictory statements, probably increased the judge's perplexity. Denuded of verbiage, the point was: "Are detached ore bodies and connected stringers to be regarded as part of the vein and entitled to all the extralateral rights with the dip of the vein itself?" In this case the apex of the zone was divided in an extensive way—part in the ground of the defendant, part in that of the plaintiff. The verdict (which was a costly one to all concerned) was in favor of the plaintiff, who had sued for damages in the sum of $150,000, the alleged value of five-sixths of the ore taken from certain stopes on the Windlass vein. The defendant admitted in the course of the trial to having taken 18,039 tons of ore, to the value of $46,144. The question of the amount of damages was submitted to the jury, upon which amount it was unable to decide. The other case was in Colorado, on the application of the Portland Gold Mining Co. of Cripple Creek to restrain the Uinta Tunnel Co. from extending its tunnel through the Lowell claim, one of the properties of the Portland Mining Co. The claim was located in '91, the tunnel site in '92. The tunnel is now in 2300 feet to where it strikes the Lowell. Upon reaching the Lowell, the Portland Co. secured an injunction. The contention was over the right of the Uinta people to extend their tunnel through the Lowell claim. The Portland Co. set up that, under the ruling in the Royal Sovereign case, lately decided by the same judge trying this case, a tunnel cannot be extended through a mining claim of earlier location; another point being that a tunnel site, which starts on unappropriated public domain, with one or more valid claims in its path, cannot cross them. The judge, at present writing, has the case under advisement, new points having been brought up that tend to discredit his former decision. It looks as though the tunnel people would be defeated. In both cases the judges are men of unusual experience and ability, of reputations beyond reproach, and yet they are unable to satisfy themselves, much less administer equal and exact justice. The two cases cited are the latest exemplifications of the much needed simplifying of our present Federal mining law. What is deemed by many as needed in the former case is the abolition of all "extralateral" rights; in the latter an amendment showing what tunnel projectors may justly claim.

Some Further Answers.

A Yuba county, Cal., man wants the "straight" of the present muddle about river improvement and appropriations. This whole thing has been explained at length in previous issues, and what can now be said good of it is not new, and what can be said new of it is not good. Some of those whose interest it is to delay, and whose official position would be cut short by proper expenditure of the money, have succeeded in tying everything up, so that little is being done except talk and refer numerous speculations and hypotheses to State and Federal Attorney-Generals and privates, who furnish opinions that are sufficiently obscure to justify further delay. The most recent suggestion has been that in the case of the $250,000 appropriated by California for the construction of restraining barriers, Congress having voted a similar sum for the same purpose, the Secretary of War be empowered to make contracts whereby it is "agreed that the United States shall pay one-half or other proportion of the amounts stipulated, and the contractor shall look solely to the State of California for the other half or other proportion of the same under the said State acts," the Secretary of War, as in the other instance, being authorized to receive payments from this State as the work proceeds.

With this view the Sundry Civil Appropriation bill (which was reported favorably to the Senate on the 30th ult., and which will undoubtedly go through) contains an appropriation of $250,000 "to carry out the act of 1896 for the erection of restraining barriers under direction of the War Department, and in accordance with the recommendations of the California Debris Commission, provided that California furnishes to the United States Treasury any amount already appropriated or to be hereafter appropriated by the California Legislature. The Secretary of War is authorized to enter into an agreement that the contractor shall look solely to the State of California for one-half of such expenditure to be paid out of said State appropriation, and the United States shall in no manner be liable for said one-half."

As to the construction of restraining barriers, for which both State and National appropriations have been made, it is a matter of regret that greater progress has not been made in the matter. It was long ago supposed that every possible obstacle to the expenditure of the appropriations made respectively by the State and National governments had been overcome, and that nothing remained to be done but to proceed with the work. The appropriation by the Federal Government of $250,000 in June, 1896, was absolute and without condition and is so held by the Controller of the Treasury in his letter to the Secretary of War dated October 2, 1896. In answer to the specific question as to whether or not the appropriation was absolute and without condition the Controller, among other things, says:

"I do not think that a compliance with the terms of the proviso that the Treasurer of the United States is authorized to receive a State appropriation can be construed to be a condition precedent to the use of this appropriation for its intended purpose. This proviso does not read '*provided* the Treasurer of the United States *shall* receive from the State of California any and all sums of money appropriated by the State,' but it is that 'he is *authorized* to receive such appropriation.' In my opinion, if no appropriation were made by the State this $250,000 would (other conditions being complied with) still be available."

Neither is there any difficulty about the expenditure of the Federal appropriation. The Attorney-General of the United States in a letter to the Secretary of War dated September 15, 1896, lays down clearly the course to be pursued by the California Debris Commission in the expenditure of this money. The Attorney-General states that any contract let for the construction of restraining barriers should contain express provisions that the contractor should look for one-half of his pay to the State authorities. Among other things, the Attorney-General says:

"If the California State authorities satisfy the contractor that they may be relied upon to assume one-half of the expense, and if they are willing to go into such a contract as seems to be contemplated by

the California Debris Commission, the Commission are at liberty to consult with the United States Attorney for the Northern District of California with relation to the details."

The two letters quoted above were before the legislative committees at Sacramento during the last session of the Legislature, when the language of the State appropriation was so changed as to meet the requirements suggested in the letters last referred to. It seems that all has been done that is necessary to be done by both Congress and our State Legislature to enable the sum of $500,000 to be expended in the construction of restraining barriers for the purposes set forth in the language of the respective appropriations. The latest mentioned appropriation permits contracts for $500,000 to be entered into by the War Department, though, so far as the debris dams are concerned, it is understood that nothing can be done until there is a report of the Commission, which is expected shortly.

This is a matter in which valley and foothill residents are alike interested. It is a matter of sincere regret that so much effort (that was thought at one time to be successful) has been thwarted in its just result by State officials.

From Colfax, Cal., is asked the difference between "tunnels," "adits" and "drifts." Without assuming to be technically exact, it may be said that the term "tunnel," under the strictest construction, can correctly be applied only to a horizontal passage, slightly inclined, if any, through a hill and open at both ends. The general understanding, however, is about the same as that of an "adit" or "drift"—that is, a nearly horizontal passage from the surface through which a mining claim may be entered, worked or unwatered. As to the remainder of the inquiry as to what constitutes a drift or running a tunnel, since the absurd decision of the Supreme Court of this State in the case of Jorgensen vs. Diller, it is difficult to determine what the judicial interpretation of any of these terms may be. In that case the Supreme Court of California saw fit to solemnly announce that drifting in a tunnel meant taking earth, gravel or ore from ground made accessible because of the tunnel; but that it was not synonymous with running a tunnel. According to that decision, there is a difference between a miner working on a crosscut tunnel until it reaches the ledge, and working upon a tunnel which follows the vein. It will be noticed that this paper uses the word "tunnel" in what is believed to be its ordinary common-sense meaning. So far as ordinary mining usage is concerned we fail to note much, if any, practical difference between the terms "adit," "drift" and "tunnel." Probably if there were any, it would be constituted in the possibly larger size of the subterranean passage designated as a "tunnel."

From southern California, more especially around Randsburg, come several inquiries as to assessment work and recent Federal rulings, that can in general be answered by the long article on this subject in the issue of the 19th ult., which explained the situation and the recent ruling of the Secretary of the Interior regarding the patenting of mining claims, which allows mine owners to July 1st, '98, to secure mineral patent on a group of claims on proof of a total expenditure of $500 for the entire group. It is to be borne in mind that this ruling is merely an extension of the time from January 1st, '98, to July 1st, '98; and after July 1st, '98, the ruling of December 15th, '97, which set aside all former rulings on this subject, comes into effect; that is, on all applications for mineral patent made and passed to entry before July 1st, '98, proof of an expenditure of $500 upon a group of mining locations will be admissable and allowed; but after the 1st of July, '98, all applicants for patents must show an expenditure of $500 upon each claim, in compliance with the famous Ruling 53 of the General Land Office which was issued December 15th, '97.

Regarding the questions asked as to it by two of the inquirers who thoroughly understand the foregoing, it may be said, that owners of groups of claims, by quick work, could rush their applications and secure patents before July 1st, '98; but it would have to be very quickly done. This is April 2nd; it takes sixty days to advertise the application through the Surveyor-General's office; yet by close connection right through, an applicant can take advantage of the extension of time, as there is still practically ninety days in which to make application, begin advertising it, and get the application for patent passed to entry before July 1st, '98. But it must be borne in mind that after July 1st, '98, in any event, not less than $500 worth of work must be satisfactorily shown to have been done upon each claim, whether grouped or not, for which an application for patent is made.

Another inquirer on this subject of assessment work is informed that annual assessment work on an unpatented mining claim is virtually done to keep the claim from lapsing. There is no point in attempting to keep the "title" up. Had the inquirer, for instance, located a mining claim five years ago, and never done anything after that in the way of active work, while the claim would be jumpable at any time, yet he could get in now, were the claim not relocated, and by doing $500 worth of improvement work, get a patent immediately. The question is simply, in a case of this kind, if the locator thinks the claim is worth jumping or not. If he thinks it is not likely to be relocated, he can defer putting any work on it and take his chances; if he thinks it is, the sure way to keep his title alive is to see that $100 worth of work is annually put on it.

Returning to Ruling 53: It is believed by many practical miners that putting it in force will ultimately inure to the general benefit of the mining industry everywhere. Discussing this subject, one authority says:

The ruling allowing an applicant to obtain a patent for a group of claims with an expenditure of no more than $500 upon the whole was all wrong. It worked an injury upon the capitalist, upon the prospector, and upon the community. Under it men were enabled to take up the entire side of a mountain, and if they could make the Surveyor-General believe that a few shallow workings, for which $500 had been expended, would develop the whole, they could get a patent. In this way valuable tracts of mineral land could be held from the prospector, the introduction of capital for the development of the ground would be prevented, and the community would be deprived of the results that would follow development. The law contemplates the expenditure of $500 upon each claim and when the Land Office construed the law so as to permit the patenting of an entire group with no greater expenditure it was a gross injustice to the entire mining industry. The ruling of Commissioner Hermann restoring the old practice of the department in accordance with the law was right and should have been allowed to stand without any extension of time. Because the law had been disregarded once is no reason for the continuance of illegal methods.

Where a miner owning part of a claim wants to get it patented against the wishes of the other part owner or owners he can apply for and have patent issue in the name of himself and other owners. The government will not issue a patent for a divided or undivided interest in a claim. The cost is the same whether jointly or individually owned, and the usual government fees must be paid. Just how that last question can be settled is entirely between the disagreeing partners or owners. But no dissenting part owner can prevent the other or others getting a patent and using his name in the application therefor.

The clipping taken from the Denver *Mining Record*, sent by a Georgetown, Colorado, subscriber, regarding tracing platinum to its original rock source, and accompanying questions, requires more space for extended answer than is at present at our disposal.

Platinum is usually widely found minutely disseminated in serpentine rocks or their debris. Only in the Ural mountains in Russia does it occur in grains, and so far as known, it is only in that region that platinum is largely mined in commercial quantity.

Some time ago a mining and scientific research on the Similmakeen river, B. C., resulted in the discovery of platinum as usual in placer ground, but under circumstances that gave color to the assumption that a belt of diorite cut by the river at that point was that metal's matrix, and would there be found —a theory that considerable subsequent work did not tend to establish.

So far as the writer is able to learn, platinum is not found anywhere except as a placer deposit. On the Demidoff estate and in the Goro-Blagotat district, Russia, unlike anywhere else, platinum is mined for itself alone. It is there found in a 10-inch streak of sand, resting upon a serpentine bedrock from 10 to 40 feet below the surface. A shaft is sunk to bedrock, a drift run, the sand hoisted and fed with water from a stream or sluice. Several thousand men and women are employed there—the former earning about 60 cents a day, the latter about 35 cents. It costs $16.75 per kilo to wash this Ural platinum sand, which would be about 40 cents per metric ton. Sand containing less than three grammes of platinum per ton is not considered profitable; it averages about four grammes per metric ton, on which there is a Government tax of 3 per cent.

A little platinum is yearly produced in this State, mostly found in connection with iridosmine in northern and central California, about 500 crude ounces Troy per year being thus produced, and worth in this State about $6.50 per ounce.

A Lillooet, B. C., correspondent asks at what rate per ton gold is absorbed by new copper plates. We hesitate to state with definiteness. This has been for many years the subject of inquiry and experiment, and so far as known nothing positive can be said. The most recent experiments that have come to the notice of the writer on this subject were made last February at the Simmer and Jack, Johannesburg, South Africa, the experiments going to show that first gold was absorbed there at the rate of about half an ounce to the ton of ore milled. Just how long such absorption continues is also an unsettled question. It is generally accepted that the primary absorption is the greatest; but the process of absorption is a continuous one.

The same correspondent wants "a quick way" of freeing copper plates from gold. One good way would be to put them over a charcoal, coal or coke fire and slowly evaporate the quicksilver off them. Where admissible, the fireplace of a spare boiler can be utilized, using a thin red fire. After the entire evaporation of the quicksilver the plates should be slowly cooled, rubbed with muriatic acid and put in a damp place over night, then rubbed with a solution of sal. ammoniac and saltpeter, and again heated slowly over a red fire. They must not be allowed to get red hot; when the proper degree of heat is reached the gold scale will rise in blisters, when the plates should be taken from the fire and the gold scraped off. Any part of the plate on which the gold has not blistered should be rerubbed with the solution and again fired. The gold scales should be collected in an earthen dish and covered with nitric acid, till all the copper is dissolved, when the gold can be smelted in the usual way; but after it is melted corrosive sublimate should be put in the crucible till a blue flame ceases to be given off.

The U. S. Patent Office.

The report of the Commissioner of Patents for the year 1897 shows that during last year there were received 45,661 applications for patents, of which the patents granted amounted in number to 23,729, including designs; sixty-five patents were reissued, and sixteen prints. The number of patents that expired was 12,826. The total expenditures were, $1,122,843, the receipts over expenditures, $252,798. The total balance to the credit of the Patent Office in the Treasury of the United States on January 1st, 1898, was $4,971,438.

Mr. Greeley has this to say regarding practice before the Patent Office:

"Under the over-liberal rule of practice by which any person of intelligence and good moral character may appear as the agent or attorney in fact of an applicant, not a few such attorneys have in the past been permitted to practice before the office, with the result that, on applications badly prepared and unskillfully and carelessly prosecuted, patents were issued which, while valid for all they claimed, were worthless in that they failed to adequately protect inventions which, properly claimed, might have been worth thousands of dollars.

"An earnest attempt was made during the year to correct abuses which have arisen in consequence of this liberality of practice, and several attorneys whose operations savored of confidence games, by which the unwary and unlearned lose their money, were disbarred."

Applicants for patents cannot be too careful in choosing their patent attorneys, for upon the ability and rectitude of the patent lawyer depends largely the satisfactory securing of the requisite patent. In this regard it is worthy of notice that the books of the MINING AND SCIENTIFIC PRESS Patent Agency, of which Geo. H. Strong is manager, show that during '97, of the applications for patents made through that firm over 90 per cent were granted, while reference to the totals quoted show that of the aggregate of applications less than 52 per cent was granted.

Electro-Chemical Treatment of Ores.

In some notes on the electro-chemical treatment of ores by C. E. Webber, an illustration is given of one of the simplest forms—namely, the circular vat, with the shaft of the anode in a vertical position. (See illustration and foot-note accompanying it).

In this, the space between the revolving anode and cathode is free from all obstructions, the disadvantages of which are that they tend to cause the ore under treatment to accumulate upon the cathode, and prevent perfect parallelism between the surface of the mercury cathode and the effective under-surface of the anode. The sludge is constantly and gently swept by the current from over the cathode, so as to have no tendency to settle on it, and also so that that portion of the sludge which is above the anode should not acquire such a continuous rotary motion as to cause the heavier particles to be carried outwards by the centrifugal action, and thus to travel round in the same plane, instead of in their turn being subject to the combined action of the electric current and the chemical agents employed.

This draws attention to the necessity that efficient agitation should, in the first place, maintain the sludge perfectly homogeneous throughout its mass, and, in the second place, should not be such as to disturb or break up the mercury cathode. In the example cited this is secured by regulating the speed at which the anode is driven, according to the size of the vat and the number and length of arms that are attached to the shaft, either for the support of the anode plates, or to act only as stirrers. For instance, subject to the density of the sludge, it is found that, if the speed of the agitator has to be lowered 30 per cent, the number of arms should be doubled.

As the diameter of a vat is increased, in order to maintain homogeneity in the mixture, the rate of motion at the periphery of the agitator would have to be increased, but to the detriment of the surface of the mercury cathode, namely, above a rate of about 8 to 10 feet a second. To avoid this the number of arms is increased. Provision is also made, to meet special circumstances, to add arms which vary in length, which may form part of the anode or not.

The proportion of water to ore in the sludge is a condition that also affects this department of the treatment, and it is found that between equal weights and proportions the best results are obtained when the water weighs three-fifths of the ore.

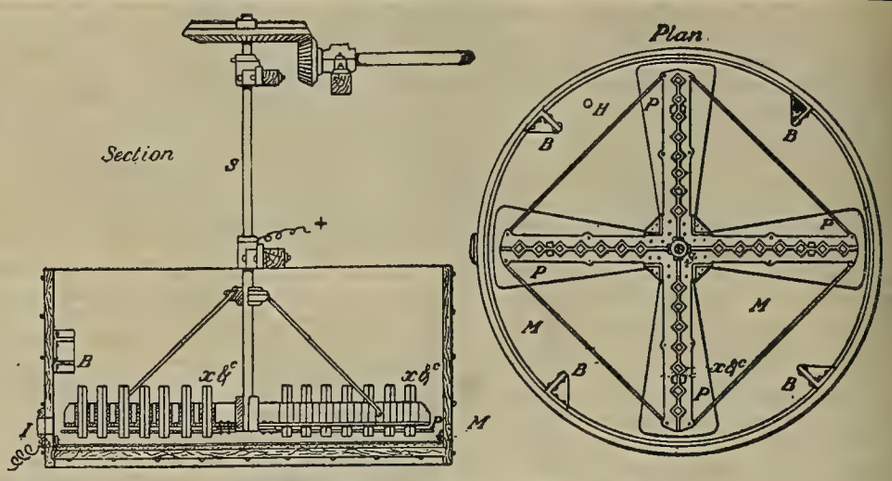
As regards the current, the potential should be capable of being governed between five and fourteen volts, and this must be done by resistance fixed in the circuit of each vat or group of vats. For instance, when using vats of 9 feet interior diameter, each capable of treating two and a half tons of ore, in two shifts—total, five tons—in a day of twenty-four hours, should a plant to treat 200 tons of ore a day be worked, forty vats will be required, and these would probably be governed in eight groups of five vats in a group. The quantity is regulated by the resistance in that part of the external circuit which lies between the electrodes. Provision is made for a minimum quality of one and a half ampere per square foot, being half the sum of the cathode and anode together in square feet; thus, if that area is equal to 52 square feet, the current should not be less, and not much more, than thirty-nine amperes.

During the whole time of treatment, "agitation," as distinguished from "percolation" or "circulation," is going on. The stages may be with or without the accompaniment of an electric current during portions of the time, but in any case the current is used during more or less of the time.

The liquid may contain sodium chloride (Na Cl) or potassium cyanide (K C N) alone, or both; but, as the sodium chloride is directly and in the first instance used to "reduce the resistance" or "increase the conductivity" of the solution, there is no stage during which—except for the purpose of mixing—it is used alone, without being accompanied by the current.

The expressions "reduction of resistance" and "increase of conductivity" are useful because they are easily understood; but they are not correct as applied to the solvent, i. e., water. These descriptions of the effect of the mixture of sodium chloride in a solution, and then placing that solution between an anode and a cathode, is scientifically inaccurate. What happens to the sodium chloride in solution in the water is that it is disintegrated and re-formed, and thus it becomes the intermediary by which, at the instant that chlorine gas and sodium are set free, the current is enabled to "commuicate" between the electrodes.

During the time of electrolysis, when the liquid contains only sodium chloride (Na Cl), the primary decomposition will be sodium (Na) and chlorine (Cl). In practice the quantity by weight of Na Cl may be between 0.2 and 1 per cent of the weight of the ore in the sludge, but this depends upon the nature of the gangue. In any case, the presence and addition as required of sodium chloride is a regulator of the electrical resistance of the solution which at any given moment is situated between the cathode and the anode, and, as the resistance in the conductors



ELECTRO-CHEMICAL TREATMENT OF ORES.*

counts for very little, it practically affords means of governing the current in the external circuit of the electrical generator or dynamo. Of the several compounds which might be used for the same purpose, common salt is doubtless much the cheapest.

As the sodium is liberated, in contact with the mercury cathode, a small proportion will no doubt be dissolved in the mercury as an amalgam. If the current ceases, this is converted into sodium hydate (Na HO), with liberation of hydrogen.

But the greater part of the sodium liberated will react at once with the water in the solution, giving Na H O and H, the former to be used as described further on. Most of the chlorine liberated will at first be dissolved in the solution, but, as the liberation will take place at the surface of the anode, a small quantity will be used up in attacking the metal of which the anode is made.

While this is going on, the liquid immediately in contact with the cathode will become rich in sodium hydrate (Na H O), and the agitation will cause it to come in contact with the chlorine liberated at the anode, with some of it to re-form sodium chloride (Na Cl), and with another portion sodium hypochlorite (Na Cl O) and water (H_2O).

This formation of hpochlorite in solution will, subject to the adverse conditions caused by agitation, be directly in proportion to the quantity of Na Cl used to regulate the resistance, and with the relations of the areas of the anode and cathode respectively.

But this formation of sodium hypochlorite will be limited to the extent to which the sodium hydrate above referred to, when it is liberated at the cathode, rises to lay hold of the chlorine which is rich around the anode. This we may regard as taking place in spite of the agitation of the stirrers, which probably tends to cause temporarily a rapid diffusion of the chlorine and sodium hydrate separately in the solution, although eventually they must come together.

Although, when not in excess, it is a useful oxidizer, this formation of sodium hypochlorite has little advantage; and when potassium cyanide is added to the solution, it is, when in excess, even when alkaline, likely to oxidize some of it into potassium cyanade—a decided disadvantage, as it is a salt which is easily decomposed, and much less useful.

Considering what may be effected by the chlorine liberated, but not engaged, as above described, one might expect the nascent chlorine to attack some of the baser metallic ores present in a finely divided state. For instance, sulphides, selenides, arsenides, etc., often attached to particles of gold or silver, would be so attacked, the chlorine uniting with metallic base iron or copper, and the sulphur selenium, or arsenic, being oxidized by the combined action of the chlorine and sodium hypochlorite above alluded to, into sulphuric, selenic or arsenic acids.

These changes would be marked by the formation of sodium sulphate, sodium selenate, etc., and the consequent formation of free acids, including hydrochloric acid.

This probably represents what actually is the cause of disintegration of some of the metallic compounds which are present in refractory ores, as the chlorine attacks these first in preference to the gold. At the same time, it is no doubt the case that, as the process continues, some of the gold is brought into solution by the chlorine diffused through it, as chloride of gold ($AuCl_3$), which is readily deposited by electrolysis on the mercury.

We all know that the solution of gold by chlorine is in common use, but I think that in the example given it is effected under novel conditions, the chlorine being added electrolytically instead of mechanically.

During the first two or three hours of treatment by agitation with the electric current, there is no doubt that the free gold which is not dissolved will be precipitated, the heavy particles at a very early stage of the process.

In all such mixtures there is also more or less of float gold, which in the processes using percolation, and even circulation, is lost in the slimes. These particles, if they escape solution, will be so well mixed up in and diffused through the solution by agitation that they should all in their turn be brought into close neighborhood of the mercury surface of the cathode.

The advantage of mechanically adding small quantities of sodium to mercury employed in gold extraction to assist amalgamation has long been recognized, but in this case the sodium so used is provided electrolytically. There is little doubt that the heavier particles of gold and silver which reach the bottom by subsidence will, owing to the surface being strongly polarized both by the current and by the slight amount of sodium amalgam formed by the current, be more readily amalgamated, and the same conditions also will promote the seizure by the mercury of the minute particles of float gold and silver when they approach the surface. The reason for this is probably, not merely that it is thereby kept clean, i. e., free from oxide, but that the difference of electrical potential set up between the mercury and the liquid alters the surface tension at the liquid junction, and helps the metallic particles to come in actual contact with the mercury. This is, I believe, a new way of defining what occurs when what is called "prevention of flouring" and the establishment of metallic contact with the mercury takes place.

* The revolving anode is mounted so as to be suspended from above in the vat at the lower end of a vertical shaft, S, braced and supported in the manner shown in the drawings.

The lower surfaces of the iron plates, P P, etc., attached to the under sides of the lowest tier of projecting arms, are in the same horizontal plane, and are carried at a distance of between 4 and 6 in. from the mercury cathode, M, which is a matter of regulation according to conditions which are well understood.

The positive connection from the dynamo is by way of the vertical shaft and a rubbing contact connected with the conductor.

The connecting cable from the negative pole of the dynamo is led to the copper plate of the cathode, M, with which it may make connection at one or more points.

In the space between the anode and the cathode the actions and reactions described further on take place, and the metal which is absorbed or taken up by the amalgam is there allowed to collect through the continuance of the treatment of successive charges until, when it is saturated, a clean-up takes place. According to the richness of the ore, a clean-up may be necessary at intervals of, say, two to fifteen days.

In order that the agitation of the sludge may be such as to prevent the accumulation of heavy material on the surface of the mercury, the revolving arms are provided with pins, x x x, vertically, and projecting downwards to within a short distance, say, an inch, of the cathode. These pins, as shown on the drawing, also project upwards, so as to help to maintain agitation throughout the liquid mass.

In order to correct the tendency to continued centrifugal movement of the liquid, projections, or baffiers, B, B, etc., are fixed at intervals to the inner side of the vat above the arms, either vertically or at an angle to the vertical. By their influence the revolving current is broken up, and guide inwards and downwards, so as to oblige every portion to pass in rapid succession through the space below the anode.

The pipe opening at the side of the vat and a little above the bottom, I, is for drawing off a charge at the expiration of its treatment; and the hole, H, in the bottom is provided for the purpose of drawing off the mercury at the time of periodical clean-up.

The Engineer in Modern Warfare.

The present agitation in connection with a possible outbreak of war brings to the public mind most forcibly the remarkable extent to which engineering has entered into all the details of modern warfare. Whether war occurs or not, it cannot be but realized that it is to the work of the engineer more than to any other member of the community that the country must look for defense and offense, and that it is in the machine shops and shipyards, in the drafting rooms and mechanical laboratories, that the destinies of modern nations are to be decided.

One has only to look back a few hundred years in history and note the absolute transformation wrought in warfare as soon as the introduction of gunpowder and fire artillery became an accomplished fact. The trained knight, bred to arms, and honestly believing that in him lay all the science of warfare that could ever be possible, was suddenly transformed into a ridiculous Don Quixote, helpless before the rude band of peasants, who, with their "villainous saltpeter" made all his knowledge of the art of war obsolete. To-day we are undoubtedly on the verge of a similar transformation, and should

he misfortune of war become a dire necessity, there s every reason to believe that the ingenuity of merican engineers, constructors, and inventors ould evolve devices of destruction before which the xisting battleships and fortifications would soon be elegated to obscurity. Two instances of most re- ent occurrence have demonstrated the weakness f modern warships; one the ease with which the ingle blow of a ram sent the Victoria to the bottom f the Mediterranean, the other the havoc which a ingle explosion wrought upon the Maine in Havana arbor. The modern warship is fatally like the rmored knight of mediæval times, vulnerable be- ause of exceeding bulk and clumsiness, a fair mark or the skill of the engineer who can combine force nd motion and substitute rapidity for massiveness, nd secrecy for strength.—The Engineer.

Concerning Certain Physical Theories.

NUMBER IV—CONCLUDED.

Evolution traces the descent of man and the higher nimals through older and simpler forms to a pri- neral germ by ordinary generation modified by en- ironment and natural selection. There has been ome variation under natural selection, but more nder artificial selection—the influence of man. This atter must be eliminated from any estimate of hanges in past eras. What is the meaning of the ouble sex which runs through all animate nature? lainly, it is the same reason that leads nature to eny fertility to cross-breeds and causes the prefer- nce for opposites, as when tall men choose short omen, etc. It is to average the species, to limit ariation. One sex would run into endless diversity. f variation be the great and good agency which has eveloped the higher animals, and improved on na- ure's original crude ideas, why does not nature give ree play to it? Why such care to bring back all ariations to the general average of each species? Natural selection is said to have "improved each reature in respect to its surroundings." Yet it is emarked that "in no country are the natives per- ectly adapted to their conditions, for foreigners ave taken possession in every country." Hence it ollows that animals are best adapted to conditions ifferent from those that moulded them, and to hich, by the theory, they should be best adapted, hus the exact reverse of the Darwinian theory. In- tead of the increasing variations called for by that heory, we see now and in past ages a careful pres- rvation of each species at its average, not at its est, and after a time a new and better species a tep forward. What is called a demonstration of volution is only a showing that these steps were horter than previously supposed and the series ore nearly complete, besides two other facts, that n all animals are vestiges, often useless, looking ack to older and simpler structures, and that em- ryos pass through stages resembling those older orms. All these four facts may be capable of an in- erpretation different from that given to them by volutionists.

If life be carried back to a single primordial germ, special creation only can account for that germ. But that accounting is far more difficult than that or all subsequent life, or for 10,000 subsequent spe- ial creations. Which would a builder sooner under- ake, to erect a palace of marble and iron and vari- us woods, with windows and carpets and stoves and urious bric-a-brac, or to contrive an acorn that would grow into all these? The mystery of the egg s greater than the mystery of the mammoth. For hese and other reasons, Darwinism fails to shed any ight on the origin of life or the methods of creation.

Two facts, the series in past and present from east to greatest in animal form and the unity of lan through all, are plain. If species really, as a natter of fact, arose by natural selection, environ- ment, amount of food, etc., they are of two things: either all these variations that include anything new were successful or that some were failures. There are no failures in nature, and no instance of even a partial failure. In all animal remains we find noth- ng crude or experimental, but only ideas thoroughly, perfectly and successfully worked out. The organs and parts of every creature have perfectly fulfilled their function. In proof, every species has existed for ages. If survival of the fittest be true, and the process has continued for millions of years, the mod- ern forms ought to be so immensely superior in the art of getting a living that the older would have no chance at all in competition. Yet some of the very low forms have persisted from remote geologic eras and are to-day thriving and successful, as the am- phioxus, the round-mouths, the garpike, the ephem- erids, and others. If all variations showing new parts were successful, how did it happen that an animal or a succession of animals could originate an organ or a part different from and superior to its own, serving often a different purpose without ex- perimentation or failure. Such would be possible only to antecedent knowledge and constructive skill, and only to an intelligence capable of holding a com- plete idea prior to its material embodiment.

The history of animal forms in times past is the history of the introduction of new ideas, an intro- duction invariably successful at the right time and manner, of remarkable workmanship and invariably based on a transcendent and perfect knowledge of the laws and attributes of matter. A few examples may illustrate: The eye is the most wonderful organ in nature, except the brain. The animal eye and the insect eye are based on totally different principles. The latter uses only a few straight rays of light from an object, received perpendicular on a few out of many thousand facets. The house fly has 4000 such facets, each a complete eye; other flies 25,000. The animal eye refracts all the rays to a focus, using in doing so a whole series of devices, showing marvel- ous ingenuity and astounding knowledge of optics, as the iris, the varying density and curvature of the crystalline lens, the round lens for water and the latter for air, the muscles for varying that curva- ture to adapt vision to near or remote objects, etc. By no possibility could these two radically different principles ever in the remotest past have been the same, or one have developed from the other, or both from something else. By no possibility could either have originated in any animal brain or in the con- sciousness of unconscious matter, nor could the ex- quisite workmanship shown in every detail have been wrought by "environment, exercise, or the in- herent power of the organism," the three alleged causes working with natural selection. Was it frog brain or something lower that first thoroughly under- stood the intricate laws of light and wrought pa- tiently for thousands of years to make a tool for perception of that light of which it had no knowl- edge? The fish eye in water and the animal eye in air require different lenses, but only an antecedent knowledge could have designed them; they could not have grown by degrees, for any degree short of per- fection would have been worthless. The mole eye is not as good as the eagle eye, but it is equally per- fect for its place. Whence came the idea of tear- ducts and lids to wash and shield the eye, things no fish has; or the idea of the nictitating membrane of birds? Not from fishes that needed them not. Yet the first animal living in air that needed such ad- juncts to the eye had them. How did the fixed fish eye change to the movable animal eye? Who sug- gested the new idea? To secure range of vision are three separate ideas: the rolling animal eye, the many facets of the fixed insect eye, and the fixed in- sect eye on a movable stalk. Who suggested to the anabas the desirability of two kinds of eyes, one for air and one for water?

Ruminants, as cattle, digest their food in a differ- ent way from non-ruminants, as horses. The prin- ciples are diverse and not derivable. The earliest animate forms digested only by solvents, as snakes, etc., do yet. Who invented the gizzard? Who in- vented grinding teeth to comminute the food and as- sist the gastric juice? Evolutionists must answer that the gastric juice, after brooding over its hard work, evolved the brilliant conception of a gizzard, and immediately went to work to manufacture it. That may sound absurd, but the idea must have come from somewhere before it was put in bodily form. The fly's foot for walking overhead, the tiger's claws and pad, the horse's hoof, the duck's webbed foot, the perching bird foot, the tree-grasp- ing monkey foot, the arched human foot, embody each a separate and distinct idea. As modes of pro- gression the fish tail, the bird wing, the large slow butterfly wing, the small swift fly wing, legs of land animals, the squirming snake, the extensible foot as in cephalopods, and other methods, are each based on different principles, are *de novo*, different inven- tions, each requiring a preknowledge of nature's laws before the idea itself could be conceived or its execution begun. Ideas are born full size; they do not grow. What seems growth or improvement is only the addition of new ideas. Quadrupeds cushion the jar of striking the ground with the feet by walk- ing on the toes, as the horse; by pads, as cats and camels, and by curving the leg just above; man by the arch of the foot, and other ways. Anthropoid apes have practically no plantar arch. If in some "missing link" an imperfect arch were found, would it alter the fact that the idea of an arch to cushion the step was then a new idea? Lungs and gills are different methods of obtaining the same result. Hair and feathers are different ideas. Warm-blooded mammal may be saved from cold, especially in water, in two ways: by a layer of fat under the skin, as in whales, or by an enclosure of air outside the skin, as in fur seals. The latter device, waterproofing, by making the hairs very small and close, is very orig- inal and beautiful. The hind legs of some quadrupeds bend forward, others backward, and the fore legs are also of two kinds; but it is difficult to see how one kind could gradually shade into the other. Was the intermediate stage a stiff leg? If so, at that point what great advantage in the struggle for ex- istence did the stiff-legged animals have? Or were the legs double-jointed between times, bending both ways? Did the double joint or the stiff joint add speed to the deer or strength to the tiger's paw? Squirrels and monkeys hold food with their two paws; the human hand and opposing thumb is an- other idea. So is that wonderful instrument, the elephant's proboscis—combining the human hand, the fly's suction pump, the monkey's prehensile tail, a trumpet and a club. A high intelligence could at some time conceive of an inside vertebrate skeleton and an outside frame, single as univalves, hinged as bivalves, compound as insects. All these are inher- ently different mental conceptions, by no possibility desirable one from another. The instincts and man- ners of life, as well as bodily form, of ants, bees, beavers and thousands of others, show in every case numerous and novel ideas; and an idea, I cannot too strongly insist, is an indivisible entity and possible only to intelligence and knowledge.

But I must arrest, even with violence, this enum- eration and turn to consider man, in whom is found indisputable proof that forces other than material nature have been and are at work; that some outside agency has from time to time injected new ideas and new devices into the mechanism of the animal king- dom. The boundless variety and ingenuity of these inventions, their bold originality and perfect execu- tion, excite our admiration and amazement. No de- fect is seen, no failure dreamed of, no improvement possible.

Anatomists fail to separate man from the monkey specifically, because each has the same number of bones, muscles, etc. Any schoolboy can instantane- ously assort them. Why? Because the anatomist won't recognize a fact that he cannot cut out and lay on the table. No effort can disguise that the reasoning, self-conscious brain of man embodies ideas boundlessly different from anything known before. Aside from reason, any one of such lesser ideas as fire making, cooking, shooting game, making tools and weapons, wearing clothes, planting seed, culti- vating the soil, making pictures, laughter, language spoken and written, inventions, religion, and moral ideas, differentialize the homo from the highest ape more widely than is the ape from the bird or quad- ruped. It is in line with these facts that we must conclude that somewhere in the infancy of man were ineradicably impressed upon the human body and brain those different ideas we call racial peculiari- ties, and vainly, now and always, strive to reconcile. Nature for some reason relaxed in the human race the iron rule of the infertility of crosses, and the white, black, red and yellow sometimes mix. Only upon the advent of man do the ideas of moral evil and cruelty come upon the scene. They are of a dif- ferent genera. What was their origin?

It is reasonable that there should be a wide range of animal structures, for there was a wide range of conditions on the earth; and if there be ten possible ways of gaining a needed end, as locomotion or di- gestion, a high creative intelligence would be quite apt to employ them all. In nature the individual is of small account, species and genera more, but ideas most of all. It is all one whether we suppose a spec- ial creation for each species, or a special creative in- troduction of each new idea and device. Either re- quires, as does the beginning of life, or any life, the act of a force outside of and superior to material na- ture. This does not eliminate natural generation. If a species of horse with six legs were about to be originated, it is quite possible we should see, as so- called freaks, numerous six-legged colts, and that these freaks would cease to be produced by the old equines as soon as the new "hexequines" had be- come firmly established, and that thereafter crosses would be infertile. This might be called evolution by natural selection, but, in truth, it would be just as much a special creation as if a full-grown pair should drop from the sky some summer morning. What I contend for is the impossibility of accounting by any process of derivation for the origin of new and orig- inal, underived ideas, or for the existence of organs, as sight, smell, hearing, etc., which require an ante- cedent knowledge. If, as I have tried to show, there are in animal structures many ideas not before known, then evolution is in effect an effort to derive something from nothing—an idea from where no idea was.

Many of the changes alleged to be survival of the fittest do not indicate any such superiority in the struggle for existence. Some animals have five toes, others four, three, two or one. There is no advant- age apparent, and all thrive. What advantage did the miohippus with three toes have over the eohip- pus with five toes? Moreover, it seems to be for- gotten that there was nearly always a long period when these supposed better forms were inchoate and therefore worthless, and having for that time no evolutional power.

If the present horse is so different from his ances- tor of the Miocene—a small, three-toed creature the size of a small sheep—why is it that the most ancient remains of man, extending nearly if not quite to the same age, show no difference at all. The lowest fos- sil skull could be matched in London or New York in ten minutes. Probably the cave dwellers could not be matched in America for strength and physical development. If evolution has changed the horse so much, why has it not changed man much more (in- stead of much less or none), for man is progressive and animals are not? If man has not changed at all in a quarter or half million years, when, at the same rate, would he merge into the tadpole?

Truly, the homo may rest secure from ancestral degradation as the product of ideas so numerous, original and brilliant, and separating him so widely from all other forms that derivation by generation or evolution is absolutely impossible.

Auburn, Cal. W. S. PROSSER.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones.*

NUMBER XI.—CONCLUDED.

By GEO. F. BECKER.

I have not been able to learn that pre-Tertiary banket has been discovered in Victoria, but it may be noted here that much of the Tertiary "gold drift" is regarded by the Australian geologists as of marine origin.

In South Australia there is an auriferous conglomerate at Algebuckina, on the Neales river, which, in the opinion of the Government geologist, Mr. H. Y. L. Brown, may be Mesozoic.

In Tasmania gold is found near Hobart, in the coal measures, according to Liversidge. An auriferous conglomerate, the age of which is not stated, has been worked at Beaconsfield, and another such pudding stone is mentioned as occurring at Mount Lyell.

In New Zealand.—In New Zealand auriferous conglomerates are found near the limit of the Cretaceous and Tertiary, and seemingly on the Mesozoic side of the line. Many such localities are enumerated by Mr. Alexander McKay. The most famous is the Blue Spur. This, according to Mr. S. H. Cox, is a Cretaceous river bed or basin. The ore is stamped and a vast amount of work has been done on the deposit. That it has yielded largely seems evident, but I find no statement as to product. The wide distribution of these conglomerates, and the fact that they lie at the base of the coal-bearing series of New Zealand, suggest a doubt as to their fluvial origin.

In India the presence of gold as a detrital product in strata is suspected, but the evidence seems to be of an indirect nature.

Conclusions.—In glancing through these notes on pre-Tertiary auriferous conglomerates, the reader will doubtless remark the fact that only one of them seems to present considerable similitude to river deposits. The remainder seem to be unquestionably marine. The exception is that at Blue Spur in New Zealand. Even in this case the description is not sufficiently explicit to justify anything like an unqualified acceptance of its reference to stream action. On the other hand, more than half of the gold gathered by man in historic and pre-historic times has undoubtedly been derived from Tertiary and post-Tertiary river beds. The contrast in origin between the later and earlier detrital deposits is striking, but very easily explained.

Accumulations of river gravel are superficial continental features of very small stability. Unless they are accidentally protected by lavas which have flowed down the river beds, the gravels are triturated and removed even by ordinary erosive action. Thus in California the discontinuity of the Tertiary gravels shows that vast quantities of this material have been swept away. Were an auriferous area to remain long enough above the sea, it would be cut down to "base level," and the river channels as well as the gravels would be obliterated. If an area marked by the presence of gravels, such as the Sierra Nevada of California, were to sink beneath the ocean at the rate of a few feet a year, most of its surface features would be destroyed or obscured. The advancing waves, creeping slowly up the slope, would cut away the prominent bluffs or hills, leaving a relatively smooth surface. When submersion was complete this slope would be found covered with coarse detrital material, rounded by wave action and sorted by both waves and currents; in short, a basal gravel would be produced, needing only induration to convert it into a basal conglomerate. Now, in this mass there would evidently be incorporated all or most of the river gravels which had enjoyed an independent existence while the range stood above water level. The river gravels, with any gold which they might contain, would merely furnish their quota to the marine littoral conglomerate. Such a conglomerate would contain gold not only derived from the pre-existent river gravels, but also from the detrital material spread broadcast over the land surface, and some or much, too, from the destruction of solid vein-bearing rocks by the advancing waves.

In the pre-Tertiary rocks only those gravels remain which were protected by superjacent beds and allowed to indurate. River gravels, as such, could escape dispersion only when during subsidence they were immediately covered in by fresh deposits, without undergoing any noteworthy wave action, and such conditions would assuredly be very exceptional. Hence the extreme rarity of pre-Tertiary river gravels. The considerations set forth in the preceding paragraph also make it clear how, currents co-operating, great continuous sheets of gold-bearing basal conglomerate may form, and in the notes above it will be observed that many of the known auriferous conglomerates are basal.

In series which show a basal conglomerate there are very frequently other conglomerates intercalated between sandstones or shales. The mechanical theory of such intercalated beds of pudding stone is much more complex than that of the basal conglomerate. It is not needful to enter upon it here. Evidence enough has been given in the preceding pages to show that in ancient formations alluvial gold is most likely to be found in marine shore deposits entirely analogous to the auriferous beaches of the present time.

* Eighteenth Annual Report Mineral Resources of the United States.

Gold Deposits, Geology and Geography of Alaska.

NUMBER III.

Gravel Terraces.—The gravels of a modern stream are not necessarily confined to the present bottom of its valley, for, as is well known, the stream is cutting down its bed and reaching a lower level from year to year; moreover, in the existing bottom its ordinary water channel, in which the cutting is done, is constantly changing from side to side. At high stages of water the stream may fill the entire valley, bringing down in its rapid course more material than it can carry away, and when it dwindles again to a comparatively narrow stream it leaves benches or bars of coarser material on either side, which in the course of its subsequent meandering it does not completely remove. Thus there are often found on the sides of the valley, sometimes at considerable heights above the present bottom, gravel benches or terraces which are relics of such flood-plain deposits, left there in high stages of the river, and when the valley bottom stood at about that level. Such gravel terraces are quite common along the upper Yukon and its various tributaries, sometimes standing several hundred feet above the present stream. Where not too high the terrace gravels often yield gold in paying quantities; but the quantity of this gold will necessarily be dependent, first, upon the gold-bearing quality of the rocks from which they were derived, and, second, upon the distance they have been carried and the configuration of the bedrock, which might or might not favor the concentration of the gold in certain spots. The successively higher terraces spread over broader and broader areas, but in a broad body of water the chances for concentration are less favorable than in one confined within a narrow valley or gorge. In some of the older mining districts, notably the Cassiar district, around Dease lake and the head of Stikine river, from which over $7,000,000 worth of gold was taken, a considerable protion is said to have been derived from terrace gravels. In general, however, they can not be expected to be as rich as the gulch gravels; but when collected in sufficient quantities and in such situations that it is possible to bring a considerable head of water to bear upon them, they may be profitably worked by the hydraulic process, as their elevation renders easy the carrying away of the tailings from the sluices. They may, moreover, have furnished important additions to the gold contents of stream gravels, where they would have been reassorted and concentrated by the action of water.

The same general remarks may be applied to gravel terraces about lake basins which may have been formed at higher stages of the lake waters. In the Silver Bow basin, near Juneau, which was once occupied by a lake, the lake beds have been found gold-bearing only on the side receiving drainage from an area where the rocks are known to be gold-bearing.

Recent Stream Gravels.—Recent stream gravels may by divided into two chief classes' bars and gulch gravels.

Bars.—In the larger streams accumulations of gravel and sand are made in places of slackening current, such as the inner side of curves, or at points where considerable coarse material is brought into the main stream by more rapid tributaries. Such accumulations are called "bars," and often contain much gold. In some cases practically the entire mass of gravel and sand in a river bed contains enough gold to pay working by mechanical processes which admit of the handling of large amounts of material at a very small cost. In earlier times the stream or river was sometimes turned from its course in order to admit of handling such material.

At the present day it has been proved that in most cases such gravel bars can be worked more effectually and cheaply by floating dredges, which raise the gravels to suspended sluices. It is not known whether the bars of the Yukon have yet been tested for gold, but there can be little doubt that they contain it in considerable amount, and it seems probable that those in the upper stretches of the river, especially near streams that drain known gold-bearing areas, will be found to be rich. Whether climatic and other conditions are such that dredging can be carried on with success must be determined by practical experiment.

Gulch Gravels.—Coarse gold can not, under ordinary circumstances, be carried very far by running water; hence it is in the gulches that the rich deposits of coarse gold are ordinarily found, and in the side gulches that it is generally the coarsest, as in them the gravel is nearest its source. It is not always actually running water that has concentrated the gold; the metal is so much heavier than rock material that a relatively slight disturbance of loose material, if continued long enough, will result in settling most of the large particles at or near the bedrocks. Still, that running water is the most important factor in the concentration of gold is shown by the fact that this concentration is greatly dependent on the nature of the bedrock; where this presents a rough, ragged surface, especially where ridge-like protrusions run across the stream, like the riffles in a sluice box, the gold is more readily caught and the gravels resting in it are much richer than where the surface is smooth, even, and without many cracks. Thus the experienced miner knows that where there is a narrow dike of harder rock, or, still better, a series of hard schistose rocks standing on edge that cross the gulch in which he is working, he is liable to find the richest concentration of gold, and that in the latter case it may even settle down into the cracks of the bedrock for several feet. The lowest channel does not necessarily correspond with that of the present stream, since the latter, as already noted, is frequently changing its course within the material accumulated in the long years during which it has been flowing, and it may have been pushed to one side or the other of the valley by landslides. The actual pay dirt is generally confined within comparatively few feet of the bedrock. Sometimes the miner finds what he calls a false bedrock, which is generally a clayey seam that marks some special stage in the history of the stream. The amount or the depth of gravel in the bottom of a gulch or valley is dependent on its size and shape, and the experienced eye can estimate approximately what it is by mentally carrying down the outlines of the rock surface on either side of the valley to a meeting under the gentler-sloping valley bottom. It is also, naturally, much thinner near the head of a gulch, and in this region, where these heads are frequently occupied by glaciers or bodies of perennial ice and snow, they generally have a rounded, amphitheater-like shape, the breaking down of the rock occurring mainly at its contact with the ice. In the great diurnal changes of temperature of the short summer months of this region the water seeping into rock cracks by day is frozen at night, and by its expansion pries off fragments from the cliffs. The material thus loosened gradually slips down; but, as a rule, not until it has been moved for a considerable distance, ordinarily some miles down the valley, is the gold thoroughly settled to the bottom along the bedrock surface.

The general character of the gravel, and of the gold itself in the gulches that have been studied, such as those in the Forty-Mile and Birch Creek districts, shows that the gravels have not been carried very far. The rock fragments are not completely rounded; they are generally rather angular, and often quite flat. The gold also is not completely rounded.

Characteristics and Distribution of Known Placers.—The extraordinarily rich placer deposits of the gulches tributary to the Klondike river above Dawson, and of similar gulches of the nearby Indian creek and Stewart river, have been so recently opened that no detailed geological description of these localities has yet been received. In his report, however, Spurr had shown that the strike of the gold-bearing rocks in the Forty-Mile district, and the exposures observed along the Yukon, indicated that their gold must have been derived from the same gold-bearing formations that had furnished the richest placers in the districts visited by him. A brief statement of the prominent characteristics of these districts as given by him will therefore probably be of value to the prospector. Geology can give only general indications and point out where gold may be found. The actual location of rich concentrations must be determined by the miner himself.

The hills surrounding the gulches of the Little Mynook and Hunter creeks, on the lower Yukon, are formed of rocks of the Rampart series. The bedrocks are of diabase, tuffs, impure shales, and quartzites, and in the bottoms of the gulches there is from 10 to 20 feet of gravel. The gravel consists in part of angular fragments of rocks that form the walls of the gulch, in part of waterworn pebbles of Birch creek schist, schistose granite, and other rocks. The gold is generally in rounded, bean-shaped grains and nuggets, and less frequently in unworn particles. This points to a two-fold origin of the gold, as derived in part from the rocks immediately about and in part from distant and older rocks, which may have been worn down, possibly along an old seashore, into terrace gravels, and then by subsequent erosion brought into the present stream beds. Further exploration in the hills to the south may disclose the true source of these pebbles and of the gold that accompanies them. On American creek, in the Mission Creek district, the gold-bearing placers are also derived from rocks of the Rampart series—quartzitic schists, serpentines, and chloritic rocks—and the gold is said by Spurr to have been derived mainly from the schistose zones in the bedrock.

(*To be Continued.*)

Coast Industrial Notes.

—The price of Oregon sheep has increased from $1.50 to $2 per head.

—Grading has begun on the Stockton & Tuolumne County, Cal., railroad.

—Ventura, Cal., proposes to issue $20,000 40-year bonds for a new electric-light plant.

—The California Powder Works at Santa Cruz, Cal., has a Government order for 3,000,000 pounds brown prismatic powder.

—The Oregon Railroad & Navigation Co. has declared a 1 per cent dividend on its preferred stock, payable this month, $110,000.

—The steel ferryboat of the Southern Pacific Co. will next August be placed on the San Francisco ferry service. The steamer will be 289 feet long, 64 feet beam.

—Work has began on the Ohio Canal Co.'s ditch from the Colorado river, twenty miles from Ehrenburg, Arizona. When completed, the canal will be twenty-two miles long.

—The steamer Wellington, from Comox, B. C., has arrived at San Francisco with a cargo of coke—believed to be the first ship arriving with a full cargo of coke of Pacific coast manufacture.

—A fir log was recently cut in Skagit county, Wash., that scaled 32,444 feet. It was 48 feet long and nearly 9 feet in diameter. Another fir log scaled 16,000 feet, and weighed 68,000 pounds.

—The sugar plant in construction at La Grande, Oregon, will cost $400,000. To keep the plant in operation requires 350 tons of beets a day and 7000 cords of wood for its season of operation, about 100 days.

—The report of the Broken Hill Proprietary Co., of Australia, whose head office is in Melbourne, shows that this concern is the largest consumer of Douglas fir in the world. For the six months ending Nov. 30th, '97 the expenses for mine timber amounted to over $75,000.

—The San Gabriel Electric Co. expects to have its plant delivering power in Los Angeles, Cal., this month. There are eight miles of tunnels and ditches and a fall of 400 feet; the pipe is 36 inches in diameter. Eight wheels, each 48 inches in diameter, will each deliver 275 H. P. to a dynamo.

—The British Columbia salmon pack for last season gives the following totals: Fraser river pack, 860,459 cases; Skeena river, 65,905; Rivers inlet, 40,207; Naas river, 20,847; Lowe inlet, 10,666; Namu harbor, 4357; Alert bay, 8602; west coast Vancouver island, 4434. Total pack for the season, 1,015,477 cases, compared with 601,570 the previous season.

—The cargo trade of the lumber mills of British Columbia amounted in 1897 to 68,000,000 feet, valued at $608,989. Of this amount the United States received about 250,000 feet. Australia bought nearly one-third of the total exported, Europe about one-fourth, China one-eight, also Japan. Of the sixty-four cargoes twenty-seven went from Vancouver and seventeen from Chemainus.

—At Portland, Or., Inman & Poulson have begun the construction of a lumber raft, to be towed to San Francisco. It will be built upon a cradle of heavy timbers, bolted and chained, and will hold 5,000,000 feet of lumber, which is as much as ten ordinary lumber vessels can carry. The lumber will be placed in layers alternating each other crosswise, then secured by chains, to make the mass solid and compact. It will be 200 feet in length, 30 feet wide and 28 feet deep.

—The exports of silver from the Pacific coast during February were as follows:

	1898.	1897.	Changes.
Silver bars	$ 381,100	$ 542,910	Dec.$ 161,810
Mexican dollars.	89,348	696,980	Dec. 607,632
Peruvian soles..	26,460	5,100	Inc. 21,360
U. S. silver	1,000	97,000	Dec. 96,000
Totals	$ 497,908	$1,341,990	Dec.$ 844,082
For two months.			
Silver bars	$ 715,700	$1,055,450	Dec.$ 339,750
Mexican dollars.	586,519	1,242,911	Dec. 656,392
Peruvian soles..	37,040	8,300	Inc. 28,740
U. S. coin	2,082	119,000	Dec. 116,918
Totals	$1,344,341	$2,425,661	Dec.$1,081,320

—Gen. Agt. Maze of the Union Pacific says: "The Vanderbilts, in co-operation with the Morgan interest, have secured the control of the Oregon Short Line stock, and in its purchase they have secured the controlling interest in the Oregon Navigation Co. The Vanderbilts asked for the presidency for Mr. Burt, and the office was accordingly given to him. The consolidation controls the Ogden gateway and with it the great Northwest. The Vanderbilts control the New York Central from New York to Chicago; the Chicago & Northwestern from Chicago to Council Bluffs, Ia.; and the Union Pacific from Council Bluffs to Ogden, and a controlling interest sufficient for a freeze-out of the other interests in the Short Line and the Oregon Ry. & Navigation Co. The total length of the line will be, including the branches, over 6000 miles, and, exclusive of the New York Central, this line across the country will be known as the Union Pacific. It is believed that as soon as the details are completed that a new force of officers for the two roads leading out of Salt Lake City will be appointed. The additional mileage to the present Union Pacific system will be 1705 miles of road. The Short Line runs from Granger, Wyo., in a northwesterly direction to Huntington, Or., where it joins the Oregon Ry. & Navigation Co., which runs to Portland, a distance of 945 miles. Another branch runs from Salt Lake to Frisco, Utah, 275 miles, while still another branch runs northward from Salt Lake. The idea of constructing a line of 400 miles from Frisco, Utah, across Nevada to Vanderbilt, Cal., the terminal of a Los Angeles line, has been discussed, but it is feared that the Southern Pacific would retaliate by turning over all their Pacific coast business to the Rio Grande Western at Ogden." Mr. Maze says that when all the details are ended, however, that the Southern Pacific will be found in the consolidation, or its influence represented in the board of directors of the new company.

Personal.

G. P. BLAIR is the new Supt. Mammoth mines, Tucson, Ariz.

PH. DEIDESHEIMER has returned to San Francisco from Skaguay.

W. F. DETERT, Supt. Zella mine, Jackson, Cal., is in San Francisco.

D. HARMON, Supt. Gaston Ridge mine, Graniteville, Cal., is in San Francisco.

R. DILLON, Pres. Jerome Copper Co., Jerome, Ariz., has returned home from Denver.

J. ROSS, JR., Supt. Wildman-Mahoney mine, Sutter Creek, Cal., is in San Francisco.

D. KEITH, managing owner Silver King mine, Park City, Utah, is in San Francisco.

G. DAY, Supt. Enterprise mine, East Fork, Cal., has returned home from San Francisco.

CHAS. H. KROUSE has been appointed Supt. Tamarack and Osceola mills, Houghton, Mich.

F. W. BACORN has been appointed receiver of the American D. & M. Co., at Gibsonville, Idaho.

F. S. ROUMAGE, Supt. Horseshoe Bar G. M. Co., Michigan Bluff, Cal., has recovered his health.

F. F. THOMAS, Supt. Gwin mine, Mokelumne Hill, Cal., has returned home from Nevada Co., Cal.

J. E. SEXTON, Supt. Cleveland mine, Placerville, Cal., has returned home from San Francisco.

C. HELMAN, Supt. Spring Valley M. Co., Cherokee, Cal., has returned home from San Francisco.

J. B. MATO has been appointed Gen. Mgr. Old Reliable M. Co., with headquarters at Golden, N. M.

J. R. PHILLIPS, Gen. Mgr. Amador Queen No. 2, Jackson, Cal., has returned home from San Francisco.

GEO. CLARK has resigned as Supt. Chloride Point, Mercur, Utah. His successor has not yet been named.

GEO. P. THURSTON, Sec'y Orleans M. Co., has moved to his new quarters, 324 Pine St., San Francisco.

H. T. SCOTT of the Union Iron Works has returned from a successful business trip to Washington, D. C.

A. H. TEN BROECK, Supt. Gold Bug mine, Georgetown, Cal., was in attendance Executive Committee meeting, San Francisco, this week.

HERMAN DAVIS AND A. HERIVAL of Dayton, Nev., will go to Guanajuato, Mexico, to test a lot of tailings with a view to treating them on a large scale.

PROF. J. G. ALLEN, mining engineer for Mariner & Hoskins, Chicago, Ill., is expected in San Francisco soon from Montana, where he has been on a business and pleasure trip.

H. E. PICKET, managing owner Grand Victory mine, Placerville, Cal., was in San Francisco this week attending a meeting of the Executive Committee State Miners' Association.

PROF. J. E. KEELER, recently elected director of the Lick Observatory, will decline the position if within "a reasonable time" the trustees of the observatory at Allegheny, Penn., where he is at present employed, can raise $200,000 to build and equip there a new observatory. To the 25th ult. $137,000 had been subscribed thereto.

W. BEDDIG, representing the Krupp Bros. at Essen, Germany, is in Salt Lake City. He is visiting the State in search of uranium. This is one of the "rare earths," and of economic value for hardening gun metal and armor plate. It is quoted at 60c per gram, $2.50 per lb. It was recently reported discovered in commercial quantities at Black Hawk, Colo.

Recent California Mining Incorporations.

The Oro Fino Gravel Mining Company, San Francisco; capital stock, $500,000; George A. Pope, William H. Taylor Jr., Augustus B. Taylor, Robert S. Moore and William E. Miles.

Hardy G. M. & M. Co., San Francisco; capital stock, $1,500,000; subscribed $140,000; E. Lichan, I. I. Brown, A. T. Vogelsang, W. Garrard, W. G. Drown.

Placerita C. M. & I. Co., Los Angeles; J. G. Evans, W. Hogan, A. C. Harmon, W. W. Ross, C. B. Ford.

Bonanza G. M. Co., Stockton; capital stock $300,000, subscribed $200,000; J. L. Bryson, C. H. Patterson, F. A. McCan, F. W. Rathentrust, G. Miller.

California M. & T. Co., San Francisco; capital stock $500,000, subscribed $310; J. R. Kendall, J. Fanbul, E. C. Loftus, C. W. Ormsby, F. H. Barnes.

Bown M. Co., San Francisco; capital stock $1,000,000, subscribed $50; W. J. Rule, P. Rowe, G. Rowe, J. M. W. Wright, E. S. Vance.

Recently Declared Mining Dividends.

Lillie, Colorado, 1 cent per share, $9000; payable April 1.

Moon-Anchor, Colorado, 2½ cents per share, $15,000; payable April 2.

Standard Con., California, 10 cents per share, $20,000; March 28.

Horn Silver, Utah, 5 cents per share, $20,000; April 1.

Obituary.

There died in West Liberty, Iowa, on the 16th ult., a man who never touched anything with his pen that he did not adorn, and who was a part of the mining life in this west half of America for over a generation. Reference is made to William Wright, known and hailed by every mining man on this coast as "Dan de Quille." Just thirty-seven years ago he began newspaper work as a mining reporter on the Virginia City, Nevada, *Enterprise*, and even among newspaper men, whose work is prodigious, he was a noted example of versatility. He was always writing something and was always at home on all themes, however divergent.

Mark Twain and he were on the same paper, and no one could ever tell from reading the jokes in that once famous newspaper which were Mark Twain's and which were Dan de Quille's. Some famous mining experts were on the Comstock in those days; but, unless signed, a scientific dissertation on mining or metallurgy would be credited alike to Dan de Quille or a mining engineer. A Sunday sketch on the fancy flow in that arid region of a babbling brook would flow as deliciously from his pen as an authentic account of a scrap on the 1700-foot level of the Yellow Jacket.

He was an ideal newspaper man, a heavensent humorist, and one of the most delightful all-around workers that ever ground out copy for the printers. He was a philosopher to the last, and though wrecked by disaster and racked with pain, steadily kept to the end his sunny nature.

Until his departure from Virginia City about a year ago, he kept up his old-time habit of sending desultory essays on sundry mining matters to the MINING AND SCIENTIFIC PRESS; and his last letter to the editor of this paper, just before his departure, was devoted largely to the details of an intended journey down the Mississippi to New Orleans, which he contemplated with much satisfaction. But he has taken a longer journey, and the memory of one of the best men that ever lived will long be with those who knew his genial nature.

F. L. PERKINS, mining expert and mine superintendent, died at Alameda, Cal., on the 27th ult. Deceased was well known in California, Nevada, Idaho and Montana. He was formerly Supt. Granite Mountain and Hope mines in Idaho.

Pennsylvania's Coal Production.

The statistics of the production of anthracite and bituminous coal in Pennsylvania for 1897 furnished by the State Bureau of Mines show that the production of anthracite decreased over 1,000,000 tons in 1897 as compared with 1896, and the production of bituminous coal increased nearly 4,500,000 tons within the same period. The production of anthracite was not less than that of the previous year; the total amount produced was less than the output of bituminous coal. The number of persons employed in mining anthracite was larger than the number employed in mining bituminous coal. This means, of course, that the amount of coal mined for each person employed was far less in the mining of anthracite than in the mining of bituminous coal. The number of accidents, fatal and otherwise, was very much larger in mining anthracite than in mining bituminous coal. The following table, compiled from data furnished by the State mine inspectors, is interesting:

	Anthracite. Long tons.	*Bituminous Short tons.*
Tons of coal mined	46,947,354	54,671,452
Tons of coke made	.....	8,533,291
Persons employed	149,557	88,554
Coal mined per employe.	314	617
Coal mined per miner	490	744
Fatal accidents	424	149
Non-fatal accidents	1,106	426
Life lost per 1000 emplo'es	2.83	1.86
Acci'ts per 1000 employes	7.39	4.81
Production per life lost	110,725	366,942
Production per non-fatal accident	42,448	128,344

There are a number of reasons why anthracite mining is the more hazardous. The mines are deeper and blasting with high explosives is more necessary; more machinery is employed in preparing the coal for market, and this, of course, increases the liability of accident. On the other hand, anthracite mines are free from the great source of anxiety and danger to overseers and miners, the formation of fire-damp or explosive gases, except under very unusual conditions.

Books Received.

"*Tutorial Chemistry — Metals;*" by Profs. Bailey and Briggs, 8vo., 300 pp., a companion book to those of the series already noted and of the same degree of excellence, of high character and adapted to college or field use. Hinds & Noble, 4 Cooper Institute, New York City; $1.

"*The Calorific Power of Fuels;*" discussed from a scientific and practical standpoint, with tables of heats and combustions of fuels, solid, liquid and gaseous, tables of constants, etc., an exhaustive discussion of calorimetry, a high-class reference book; 8vo., 40 illustrations, 279 pp. Jno. Wiley & Sons, New York City; $3.

THE seventh edition of the "Pelton Water Wheel," 1898, is out, an up-to-date account of what this wheel does, and a compendium of modern hydraulic literature of value to any one interested in this subject. It will be sent upon request. Address 121 Main street, San Francisco, or 143 Liberty street, New York City. A feature of this 100-page book is a list on pages 50–51 of 140 electric-power installations of this wheel, and on subsequent pages another fine list of about 1000 different companies who have ordered Pelton wheels.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 22, 1898.

601,123.—AWL—N. D. Chase, Pokegama, Cal.

601,014.—STARTING GATE—P. A. Finigan, S. F.

601,135.—THAWING MACHINE—H. K. Greenleaf, Portland, Or.

601,097.—MAGAZINE FIREARM—J. Harle, Vancouver, Wash.

601,002.—HANK FOR SAILS.—J. S. Jennings, S. F.

601,039.—LINEWAY—M. F. Kohinka, Scotia, Cal.

601,212.—GOLD EXTRACTOR—S. P. Moody, Magalia, Cal.

600,926.—SULPHURING CASKS—P. J. Nicolini, Oakland, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FOLDING COT-BED.—H. C. Niemeyer, Wheatland, Cal. No. 600,647. Dated March 15, 1898. This invention relates to an improved construction of cot-beds whereby when extended they are given all the rigidity of a solid structure, but are capable of dismounting and folding into small compass for transportation. It consists essentially of main side bars, extensions hinged in line therewith adapted to fold and unfold upon the main bars, having the abutting ends beveled, a flexible covering secured along the edges of the main bars and extension bars adapted to be detachably connected with the ends of the covering having mortises upon their ends to fit corresponding tenons upon the ends of the extension side bars, legs pivoted beneath the ends of the main portion adapted to fold and unfold about their pivot points, and jointed brace rods extending from the main side bars to the legs, so that the latter are braced longitudinally, and other braces between the legs at each end, with means for drawing the lower parts of the legs together to produce a transverse tension on the flexible covering and lock the cross-bars in place.

QUARTZ MILL.—H. H. Crain and J. W. Forbes, Plymouth, Amador Co., Cal. No. 600,635. Dated March 15, 1898. This invention relates to a mill which is especially designed for crushing quartz and other material. It consists of a mortar having an unyielding bed, weights with links by which the opposite ends are suspended, the bottom of said weights lying approximately parallel with the bed when suspended in the normal position, and means comprising a crank shaft and pinion extending therefrom to points near the centers of the weights, whereby they are alternately lifted above the surface of the bed and brought down upon it with a plunging movement, said links being flexibly jointed at points in their length, so as to permit of an independent movement of the weights when they strike the material below.

ANTI-FRICTIONAL HANK FOR SAILS.—J. S. Jennings, San Francisco, Cal. No. 601,002. Dated March 22, 1898.—This invention relates to an improvement in devices for the operation of sails of that class which are adapted to be raised and lowered upon a rope or stay, such as jibs, staysails and others of a like character. It consists of a device for detachably connecting sails with the stay upon which they are to be raised and lowered, this device comprising a two-part yoke, the lower end of which is made concave to fit the bolt rope upon the edge of the sail, lugs projecting upwardly through each half of the yoke, a bolt passing through the lugs and the sides of the yoke, so that this portion is united together and channels formed for the seizings by which the sails are attached to the yoke. The upper end of the yoke has a concaved roller journaled within it adapted to travel upon the stay, the journal-pin serving to unite the upper ends of the yoke together.

DEVICE FOR SULPHURING CASKS.—P. J. Nicolini, Oakland, Cal. No. 600,926. Dated March 22, 1898. This invention is designed to provide a means for purifying wine casks, hose and other conveyors which are employed in transferring wine from one receptacle to another, and also to prevent the deterioration of the wine within the cask or other receptacle when a portion has been withdrawn and the upper part of the receptacle contains air. This invention consists of a furnace chamber having a grate in the lower portion consisting of parallel bars standing on edge, so as to receive and vaporize the sulphur-impregnated strips which are ignited thereon, a plurality of screens of different mesh situated above the grate and adapted to arrest any ash or floating material, a propelling device connected with the side of the upper part of the case and a means for actuating the same, and a pipe connected therewith through which the fumes may be introduced into the cask. The sulphur-impregnated strips, being placed on edge between the parallel bars, are sustained in such a manner as to allow free ingress of air for the combustion to produce the sulphurous fumes and are kept out of contact with each other.

Commercial Paragraphs.

THE Weber Gas and Gasoline Engine Co., Kansas City, Mo., are building for the La Aurifera mine, Nuevo Leon, Mexico, a heavy single-drum hoisting engine to work 800 feet underground.

THE Arkansas Valley Smelting Company, located at Leadville, Colo., has placed an order with the Colorado Iron Works Company of Denver, Colo., for one carload of water jackets.

Cost Accounts.

One of the most important branches of the accounts of a manufacturing establishment is that by means of which the actual cost of the manufactured article is ascertained. In flush times, when orders are plenty and prices good, the cost accounts are often neglected, and the result is that when hard times come it is found necessary to investigate the methods of finding out the cost of the product, and sometimes the result is anything but satisfactory.

The cost of an article is too often a very indefinite quantity, and its relation to selling price is sometimes still more uncertain. Ordinarily the cost of a manufactured article consists of three elements: material, labor, and general expense. These are usually supposed to cover the prime cost of the article, to which the cost of selling and the profit must be added.

Of these three elements the material can usually be determined quite closely enough for all practical purposes, but the labor and the general expense cannot always be so easily measured. When the labor cost is measured by time, that is, when the men are paid by the day or hour, the time can be kept, and, if carefully watched and distributed, a fairly close approximation is obtained. When the piece work sytem is used the cost of the labor is definitely determined, and one of the strongest arguments made for piece work is the simplification it makes in cost keeping.

The expense account is the greatest source of uncertainty in cost keeping accounts. It is usually not difficult to ascertain the proportion which the general expense bears to the total output of an establishment, but there is some difference of opinion as to the fairest method of distributing the burden. The usual plan is to consider the general expense as a percentage of the productive labor cost, and in most shops the two are taken as about equal; that is, the prime cost is composed of the material, the productive labor, and an allowance for expense equal to 10 0 per cent of the labor.

While this is a comparatively simple method of distributing the expense account, it is not always a fair or truthful one, as some articles which are really profitable are given too high a cost, while others are not high enough. If by any means the labor cost on a piece of work can be reduced, this method would cause a corresponding reduction in its proportion of expense burden, while as a matter of fact such a reduction in labor cost has really not affected the running expense of the shop at all.

Thus, for instance, the introduction of certain automatic machines might readily enable one man to attend to two machines and turn out twice the product he formerly did. The result would be to halve the labor cost on the product. The expense burden, on the contrary, instead of being reduced, would be increased by the proper addition for interest and depreciation on the new machines, and could only be taken care of either by increasing the percentage charged on the labor cost, or by making the same expense charge carry twice as much output.

Some accountants maintain that the expense should be distributed as so much per man, rather than as a portion of a man's wages, and for some reasons this would result in a fairer distribution of expense than the latter method. Sometimes it is found that certain charges usually included in the general expense can with a little care be charged directly to the actual job to which they really belong. This is the case with drawing room expense and with numerous details of engineering work often lumped in with general expense merely to save detail in bookkeeping.

Again, the expense may be divided among tools, as well as men, and thus directed to especial jobs with a greater degree of precision. This is more readily done when a shop is full of work than at other times, as when tools are idle part of the time the expense still goes on and must be carried by the portion of the establishment which is working.

One of the natural results of the introduction of a really careful and intelligent system of cost accounts is the transfer of a portion of the general expense charges into specific charges against definite orders. It will be found that very many details of expense can really be placed where they properly belong, and the indefinite portion, about the distribution of which uncertainty must always exist, will be reduced to a minimum; and the cost accounts will then show much more nearly which articles are made at a profit, and which at a loss, than could otherwise be possible.

With the exception of such proprietary specialties as can be entirely controlled, the cost has only a secondary influence upon the selling price. Under the present commercial conditions selling price is fixed by competition, and one maker must usually meet the price set by his competitor. The knowledge of shop cost, however, will prevent the intelligent manufacturer from selling at a loss, or show him where he must economize in order to meet competition; and sometimes the dashing competitor who for the time fixes the market price himself keeps no trustworthy accounts, and acts only with the courage of his ignorance.

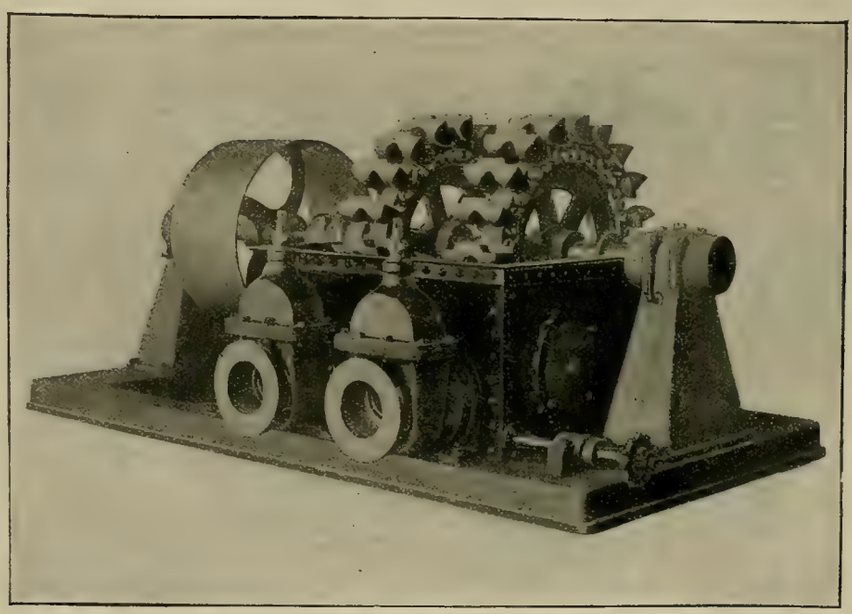
An Interesting Power Plant.

A striking example of the utilization of water power made possible by wheels of the impulse type is presented in the arrangements recently made for power in the textile goods factory of M. Benoist Cadet fils, La Bastide, a town south of Bordeaux in the Departpartment of Tarn, France. Here a steam engine, which formerly was used to furnish the power for the entire factory, is now held in reserve for periods of low water, and the greater part of the time power is furnished by a 36-inch impulse wheel, working under a head of 128 feet at 285 revolutions per minute and furnishing 40 H. P. The use of contracting nozzles makes a high efficiency possible with the varying loads.

The illustration herewith presented shows the wheel sent to La Bastide by Messrs. Powell & Colne, export agents, Bowling Green building, New York, which was furnished them by the American Impulse Wheel Company of 120 Liberty street, New York.

The photograph was taken with the top casing removed and the shape of buckets peculiar to this wheel can be observed. The high efficiency of these wheels is due to close attention and study which its engineers give to detail and to care exercised in manufacturing. A prime mover with so low a first cost, and almost negligible expense for repair and requiring little or no attention while running, is an attractive one to a large number of manufacturers who are at present burdened with heavy expenses in connection with their motive power.

The possibilities of the electrical transmission of energy are now so great that many concerns might at comparatively small expense utilize water powers, even though they were located at considerable distance from their respective establishments. The numerous inquiries on such subject which the American Impulse Wheel Company receive have the careful consideration of their engineers, and as full information is sent in reply as the data presented will permit.



THIRTY-SIX INCH TWIN IMPULSE WHEEL.

Oil in Steam Boilers.

One of the principal problems yet remaining unsolved in connection with the economical generation of steam is that of the use of condensed steam as feed for boilers without the injurious effects of the oil carried over from the lubrication of the engine in which the steam was used. There is a manifest economy in the condensation of steam, and much of the advantage gained by multiple expansion would be lost if the expansion could not be carried below the pressure of the atmosphere. Surface condensers are undoubtedly the best means of accomplishing this end, and the condensed steam makes an admirable feed water for the boiler, except when it contains such a quantity of oil as to cause deposits of non-conducting material upon furnace flues and firebox sheets. Even a thin film of grease upon the plates of a boiler furnace will keep the water out of contact with the metal, and many furnaces—both corrugated and plain—have gone down from this cause.

The extending use of sight-feed lubricators and the feeding of the oil into the steam is well known, and if we remember that all the lubricant which goes into the steam inlet must also go out with the exhaust into the condenser, and so back into the boiler, we must take into account the effect which this quantity of grease will have upon the boiler furnace plates, which are so dependent upon the protection of the water to prevent overheating.

Many of the great ocean liners, which must use the condensed steam in order to avoid filling the boilers with salt water, use filters to extract the grease from the water before it reaches the boilers at all. Various filtering mediums are used for this purpose. On some of the Sound steamers straw or hay is used, while in other instances cast-iron boxes tightly packed with sponges have been tried. On the White Star steamers the Edmiston filter is used, the oil in this case being extracted by diaphragms of woven filtering materials, compressed between perforated metallic plates, and this form of grease filter has been highly recommended. For land purposes, where space is not such an important consideration as at sea, both sand and coke have been used, and there is no doubt that by use of a sufficiently thick layer of such materials, and by frequent renewals, much of the grease from condensed steam may be removed and the water made fit for boiler feed purposes.

Where there is lime in the feed water the presence of oil in the boiler is especially objectionable, as a soft, spongy mass is formed, which collects upon crown sheets and flues, often with most disastrous results.

There are two points in this matter which, if observed, would enable much of the trouble to be avoided, and that, too, without involving recourse to any special appliances. In most instances far too much oil is fed into the steam, and the engines would work all right with very much less oil than is usually fed to the cylinders. A good quality of oil should be used, but the quantity fed should be made a minimum, not only for economy in first cost, but also for protection to the boilers. In nearly every case a most wasteful excess of oil exists, and there is loss at one end from excessive oil bills and at the other end from damaged boilers. In one well-known instance a careful engineer was using eight drops of oil to one revolution of the engines, and it was found that this could safely be reduced to one drop to eight revolutions without injury to the cylinders from insufficient lubrication.

Another point is to be noted in regard to the character of the lubricant. The high-grade cylinder oils are supposed to be made from mineral sources and to contain no animal matter. Now kerosene oil and its derivatives are found not to be injurious to steam boilers, but, on the contrary, are frequently introduced in order to loosen boiler scale and prevent its formation. The principal difficulty occurs with the small percentage of animal oil, which, in order to improve the lubricating qualities, is often mixed with cylinder oils. Animal oil should never be permitted to enter the boiler, and the lubricant used in condensing engines should be carefully examined, and the absence of animal oil assured. When this is done, and when, by close and careful experiment, the very least quantity of lubricant possible is used in the cylinders, the best precautions against injury to the boilers will have been taken.

WHEN the loading of a ship has been completed and the hatches have been put on, every precaution is taken to make them tight, so as to keep the cargo dry during the voyage. The hatches are in sections, which rest on frames laid across the hatchway. All the seams around the combings of the hatchway and between the sections of the hatch are calked and then pitched or painted, and the entire hatch is then covered with tarpaulins which are battened down at the sides. The ship may be months at sea; she may take over her bows solid water that will sweep aft, submerging her decks like a river, and she is likely to have more or less water on deck at any time; but none of it gets below. The ship's hatches are as impervious to water as her sides. On steamers when the hatches are put on they rest upon strips of rubber and they are secured by means of set screws, making the hatch tight in the same manner that a fruit jar is sealed.

Mining Summary.

CALIFORNIA.

Amador.

Dispatch: Another strike has been made in the Valparaiso mine 53 feet below the tunnel level.

The Golden Crown mine, near Drytown, struck a good streak 90 feet from the surface.

At the Pocahontas, near Drytown, they have finished cutting a station at the 600 level and began sinking again. The owners will sink 900 feet before driving a level or drift.

The Amador Queen No. 1 shaft is down 915 feet, and sinking is progressing favorably. The power drills are working well. Mr. Dye has started crosscutting east and west from the 500-foot level. Good rock has been encountered.

Ledger: Cleaning the south shaft at the Gwin mine is progressing rapidly. The old shaft is opened about 900 feet from the collar. The work of mining through the new shaft goes on steadily and the 40-stamp mill is grinding 150 tons of ore per day. Drifting and crosscutting at the 1200 level of the South Spring shaft is progressing. Ore is being encountered which is good, but so far has not come in quantities sufficient to justify the starting of the mill.

Amador *Republican*: The output of the Argonaut in February was between $56,000 and $57,000 in free gold and $9000 in sulphurets. The expenses are estimated at $15,000 a month.

The rock in the 2250 level of the Kennedy is said to mill $20 a ton.

The shaft at the Amelia has reached 500 feet. Sinking is continued and averages 15 feet a week.

The shaft at the Bellwether will be sunk 400 feet deeper.

At the Zella 150 tons of ore are crushed daily.

The Union Con. has reached 500 feet depth. The ledge runs from 5 to 40 feet in width and though low grade, has enough rich spots to make it pay.

At the Oneida crosscutting in the 1500 level is in progress. It is believed this mine will have a large mill in operation before the end of the year.

The Amador Queen No. 1 reached a depth of 915 feet. Crosscutting is in progress.

Milling ore is being produced from the 600 level of the South Eureka.

At the Central Eureka the shaft has reached 1000 feet. At the 600 level drifting is progressing in a large ledge of low grade ore. A drift has also been started in the 900 level. It is likely that a 40-stamp mill will be erected in the fall.

The Wildman-Mahoney, though low grade, is paying from $8000 to $15,000 in monthly dividends.

Work has started in the Lincoln mine.

The Columbia has struck pay ore on the 250 level.

The lien holders against the Bay State have settled their claims for 75 cents on the dollar. It is reported that the new company will begin work at once.

D. Boyson will reopen the Pioneer mine.

Butte.

Smith & Butler have opened up the old Alder Spring mine, near Nimshew, and are taking out paying gravel.

The Kappa gravel mine, between the Magalia and the Petewood, to be worked on a large scale by an English company, contains 1600 acres.

The tunnel on the Crystal Hill mine, near Enterprise, is in nearly 400 feet.

At the Gold Bank 100 men are employed. It is reported that a good ore body has been struck at the Golden Queen mine.

The Carlisle mine, near Forbestown, has a ledge averaging 8 feet. The shaft is 150 feet, from which a drift runs on the ledge 100 feet. The erection of a cyanide plant is contemplated. The property is owned by Mrs. E. Clark of Woodland.

At the Denver mine chlorination works are to be erected. There are seventy-five tons of sulphurets on hand, and a ton per day is added. The lowest tunnel is 900 feet below the apex.

The Bank of England Con. Co. has reached 200 feet. This is the tunnel which it has been stated would be driven into the hill a long distance to cut a number of properties.

Calaveras.

The treasurer's report of the Ford mine, at San Andreas, for 1897, shows receipts $27,500.20; disbursements, $26,458.73; balance on hand March 1st, 1898, $2,565.07.

The Round Butte M. Co., Sheep Ranch, reports good prospects. They are using 150 inches of water night and day. Bush & Pache report good prospects at the Bunties Gulch hydraulic mine.

The *Citizen* says it is stated that C. D. Lane will develop the Illinois mine at once. A shaft 135 feet is in good order and sufficient ore is in sight to warrant the erection of a mill.

The Gladiator mine, half a mile from Blue Lakes City, is producing good ore. The mine is owned by C. Kelton.

The *Chronicle* says that the Boucher & Brackett gravel claim in Chili gulch has been sold to J. E. Burton for $7000. Mr. Burton will at once commence work.

The Fricot tunnel, at Fricot City, has reached 300 feet, and will tap the vein at 750 feet depth.

Chronicle: M. Burton, who spent several months last fall and winter mining for quartz crystals, purchased the Boucher & Brackett gravel claim in Chili gulch for $7000 and has begun work.

El Dorado.

W. Monroe, near Coloma, found a $1000 pocket last week.

The Columbus mine, near Placerville, is being reopened. This property was abandoned years ago, owing to water and the lack of suitable pumping apparatus.

Nugget: In Cosumnes township, there is more systematic mining being done than at any time in the history of that section. Wagner Bros. are getting their mine opened in good shape. The Humphreys, J. Dunn, Whittaker & Hite, Garland and Hughes are all taking out gold.

J. Koehlert's hydraulic mine at Indian Diggings closed down on account of scarcity of water.

Democrat: The Boulder mine is putting a gasoline hoist in the main tunnel, with the intention of sinking 500 feet.

The Larkin is erecting a hoist capable of sinking 1000 feet.

F. Thomas & Co. purchased 360 acres of land near Granite Hill and began operations on an extensive scale. This is a quartz proposition, and in a shaft now sinking they have a fair prospect.

At the Starlight they are prospecting on the 400-foot level, and it is reported that good ore was uncovered the past week.

Jones & Thorsen, near Kelsey, are developing a 4-foot ledge of good grade ore.

Work was resumed at the Gopher-Boulder mine, Kelsey, after having been closed for three years. Fifteen stamps are dropping, and others will be started as soon as developments warrant.

A strike is reported in the Flagstaff, near Grizzly. The strike was made at a depth of 170 feet.

The Sunrise mine, near Kelsey, has been bonded to a company, represented by T. Dillon. The old mill is to be overhauled and equipped with new machinery, while in the mine, among other developments, a new shaft is contemplated.

Nugget: J. Melton has put men to work on the White ground, near Placerville, cleaning the old works and preparing for systematic development. It is his intention to put a 15-stamp mill on the claim.

At Grizzly Flat the Mt. Pleasant mine, which was abandoned years ago at 700 feet depth, has resumption of work and gives satisfactory results, and development of the old mine will be vigorously continued.

The Eagle King was compelled to close temporarily on account of the heavy snowfall.

Inyo.

The Reward mine, from a thirteen days' run, produced $1800. A new ore body of galena has been discovered in this property, running $60 in gold per ton.

The Jackson and Lake View property, at Lundy, will be re-opened April 1st.

Kern.

New discoveries are reported in the Panamint country; ore from that section running from $70 per ton up has been handled at the Johannesburg sampling works. As the cost of reduction work has greatly decreased in later years, the low grade ore of this section may be profitably handled which were at one time considered worthless.

The Goldman mine, near Caliente, is showing good rock as its development proceeds. The shaft is down 60 feet. The ledge is 2½ feet wide, and assays from $25 to $70 per ton.

The Maggennette had a mill run which netted $100 per ton.

A run of 3225 pounds of ore from the Yucca mine realized $432. The Merced from forty tons of ore netted $75 per ton. Eight tons of Petaluma ore produced $875.

Los Angeles.

The Puritan mine at Acton is producing pay ore from the 90-foot level. A new ledge has been discovered on this property that can be traced on the outside for 400 feet.

Madera.

(Special Correspondence).—At the Starbuck mine an old tunnel is being reopened which ran in upon the vein from the bed of Fine Gold creek. It is believed that this tunnel extends about 200 feet, and when reopened it is the intention to continue it to a point below the present shaft, in order to drain the water as well as to admit of a more economical working of the mine. In the bottom of the shaft there is a strong vein 10 inches in width. Much of the value is in sulphurets. A recent shipment of ore made for test purposes gave a return of $83.65 per ton.

Interest in the Magnet lode still continues. Lyman F. Ellis is sinking a shaft upon the lode at the Mascot location, 6750 feet northeasterly from the original Magnet shaft. The vein shows the same characteristics at this point of regular hanging and footwalls, talc gouge, etc., with quartz heavily charged with sulphurets, apparently of good grade, and a very good showing of free gold. The ore has not yet been assayed at this point. Work is temporarily stopped at the Magnet shaft pending the arrival of suitable hoisting and pumping machinery.

The pipe line to supply the Lily, Mud Springs and other mines with water from Fine Gold is in course of construction.

Gold, March 27th, '98.

Mono.

The Standard Con. Co., at Bridgeport, during the week ending March 19 crushed thirty-three tons per day, and, in addition to free gold, produced two and a half tons concentrates that run $174.72 per ton.

Napa.

Operations are to be commenced in the magnesite mines near St. Helena. Orders for ore shipments have been placed with the owners of the property.

Nevada.

(Special Correspondence).—Eastern capitalists, organized as a corporation under the laws of New Jersey, have purchased from C. D. Lane the property known as the Gaston Ridge mine, about three miles from Graniteville, for $50,000. The company has had the property under bond and expended a large amount of money in development work, the principal of this being a 2000-foot tunnel run by air compressor and power drills. The tunnel cuts a ledge of 20 feet or more at a depth of nearly 700 feet. The present 10-stamp prospect mill is to be enlarged, very probably to a 50-stamp plant.

After all the development work done by the company two practical mining superintendents have spent three weeks examining the property for the bonders, and it is known that their opinion was favorable.

In addition to these claims, the company purchases from Meade & McBeam an adjoining property which has been likewise under bond to them, and which will be operated through the new tunnel.

The Gaston Ridge mine has an authentic record of over $440,000 produced from grass roots to 219 feet depth, but it remained for the present company to develop it at depth, and the consequence has been the discovery of a larger ore body and one that holds its value fairly well.

Nevada City, March 30th, '98.

(Special Correspondence).—The Champion M. Co. are erecting an extensive plant to treat tailings, both those that have accumulated and the future product, from their 70-stamp mill. Jas. H. Rosewall, the company's chemist and chlorinator, will superintend the process on lines of his own study.

On the Orleans property, at Grass Valley, tributers have operated for some time, stoping in the old drifts at the north end of the claim, and netted $4 per day. The company is driving for the ledge on the 800 level, and expects to reach it in fifty days. Electric power is in use. The property adjoins the Empire and comprises eighty-three acres.

Work progresses favorably on the Sauvee property, in the same neighborhood. Development was recently begun on this by San Francisco people under a working bond. The property comprises ninety-three acres.

Nevada City, March 28th, '98.

Tidings: The Mistletoe mine, near Rough and Ready, is producing ore that assays $80 to the ton. The shaft will be sunk 100 feet before drifting is commenced.

The new pump at the copper mine at Spenceville has been running day and night. As soon as the water is low enough, work will be resumed taking out ore for shipment.

The new company has commenced operations at the Eagle Bird mine at Maybert. Supt. Woods intends to develop the property in a systematic manner.

Development work on the Sauvee property, near Grass Valley, continues with satisfactory results. Twenty men are employed. The parties interested are San Francisco people.

The pump being placed in the Allison Ranch mine at Grass Valley has a capacity for delivering 3,200,000 gallons water every twenty-four hours.

Union: About 100 tons of ore from the Bellefountaine mine paid $24 per ton.

Transcript: The old Sneath & Clay mine, being reopened by an Eastern company under the name of the Phœnix M. & D. Co., struck a 20-inch ledge of good ore.

At the Eagle Bird mine at Maybert has begun active operations under the new management. Supt. Wood has eighteen men employed.

At the Bellefontaine, on the 320-foot level, the ledge is from 18 inches to 4 feet thick. This property lay idle for years, but is rewarding the present operators. The company will sink an additional 100 feet.

E. Davis of Syracuse, N. Y., is in Nevada City to arrange for the opening of the Bismarck & Gladstone mine.

Placer.

The Colfax *Sentinel* says the six months just closing have been disastrous for hydraulic and shallow gravel mining operations, owing to the scarcity of water. The rainfall at Colfax to date has been 25.09 inches, as against 50.44 inches to corresponding date of last season. At Robinson's Flat, near Forest Hill, the snow is at present only 1½ feet in depth. Last season at this date there were nearly 16 feet, well settled and frozen.

The water from Hidden Treasure tunnel is as low as at the close of the summer season.

With an early spring much development will be commenced on quartz and gravel properties on the upper Forest Hill divide.

River mining can be carried on this year under favorable circumstances, as the absence of snow in the mountains will bring the river down very low early in the season.

The Morning Star reservoir, near Damascus, has not filled this winter, a condition that has not been known for years. The Morning Star and the Big Dipper mines will be run by steam during the latter part of the season.

At the Mayflower mine Supt. McAulay has fifteen men on the pay-roll. The company has had a permit to hydraulic, but thus far has not had sufficient water. A test run of ninety cars of gravel from the Mayflower mine was made recently which resulted in over $9 per car.

At the Drummond mine Supt. Berry is running on the ledge and is near the pay chute which was encountered in the shaft above. Eighteen men are employed.

The Bazacco mine, at Butcher Ranch, the property of Sheridan Bros., has a ledge from a few inches to 2½ feet in width. A tunnel has been run on the ledge 180 feet.

The Horseshoe Bar Gravel M. Co. will start the elevators soon.

At the Maus Ledge, near Forest Hill, the shaft is in 181 feet. From the 200-foot level a drift will be run to crosscut the ledge. Work will soon resume at the Spanish ledge.

The bedrock tunnel to tap the channel at the Eureka gravel mine is being rapidly driven. Last Monday week it measured 2615 feet. Supt. F. Chappellet, with power drills and two shifts, has made an average of 50 feet a week.

Supt. Power has nearly 200 men on the pay-roll at the Hidden Treasure mine. A large quantity of gravel has been blocked and drained at their point of operations in the Centerville tunnel. The gravel brings handsome returns. The electric plant is a success. The outlook for the mine is encouraging.

Herald: The electric motor is hauling out 400 cars of gravel daily for the Hidden Treasure Co., at Centerville. The company contemplates adding a new electric locomotive and 100 cars the coming season.

Dr. Manson is cleaning and retimbering shaft No. 4, which is down 125 feet on the Bellevue, at Ophir. Dr. Manson has also secured a working bond on the Decker mine, on Dutch ravine.

The Pioneer quartz mill, at Ophir, has engaged to crush 200 tons of ore for prospectors in the Ophir district.

M. O'Connor has secured a bond on the Black Spanish mine, in Ophir district.

A crew is driving the 200-foot level of the Eclipse mine. They have some good rock on the dump.

The Cash Rock mine will put in extensive machinery in the near future.

The Pioneer M. Co. is providing against future shortage of water by the construction of a dam across the American river, which, with the necessary flumes, etc., will cost about $10,000.

Riverside.

Review: The Leon M. Co. are erecting a stamp mill near Leon postoffice.

J. June has commenced operations with his cyanide plant a mile south of Good Hope.

Bates & Langford have finished their cyaniding on the old Hoag tailings. They have been occupied for six months and have produced 1000 ounces of gold.

Plumas.

The men who took the Eureka property, near Johnsville, under contract are still at work.

Many placer claims are operating in a small way in that vicinity and the general report from them is good.

M. Kniewell, in Meadow valley, is pushing his tunnel.

San Bernardino.

Reports are received of rich finds in the placer-mining section of Virginia Dale. Two men with a dry washer are said to have taken out $300 in less than thirty days.

Review: Six miles east of Danby the Jessie Lincoln group of mines, owned by Sherman Page of Los Angeles, is developing sulphate ores. A small stamp mill now on the ground is to be replaced by a larger plant.

Danby is the shipping point for the Los Angeles companies now developing salt mines thirty miles south of there. Here is the field for operating traction engines, and here lies the remains of Osborn's Leviathan—the huge monster that wouldn't pull. It is said that this experiment cost a good man an even $100,000. After this failure Best came along with his motor and hauled salt so fast the market was soon glutted. Another start is to be made, and then salt will come in at the rate of thirty tons per day.

Shasta.

Special Agent Collum of the Interior Department has finished an investigation of the devastation of Government timber by the fumes from the roasting and smelting plants of the Mountain Copper Co. at Keswick, and will recommend that the company be enjoined in the courts from operating its plant under existing conditions. It is said to be the purpose of the Department to compel the company to resort to condensers.

The output of the Altoona mine was 435 flasks of quicksilver last month. An increase is anticipated for the current month.

Sierra.

(Special Correspondence).—The Diadem quartz mine, within the town limits, is producing a species of quartz that puzzles old miners. It is rich in quality, heavily charged with sulphurets in which gold is visible, while the quartz is very hard and shines like jasper.

The Young America, one-quarter of a mile from Forest, has a bedrock tunnel 400 feet. It is intended to continue the tunnel through the ridge a distance of 1200 feet.

The Dreadnaught, near Alleghany, has 350 feet of tunnel on a ledge that varies from 3 inches to 4 feet, in a slate formation.

The Hanley gravel mine, a producing property, has nearly 5000 feet of tunnels. The main tunnel strikes the channel at 1500 feet. The gravel runs from 15 inches to 50 feet in depth. The average pay streak is 3 feet. The ground, though cement, and worked by the slacking process, pays an average of $1.50 per car.

The Rock placer claim, five miles from Forest, has a bedrock 1000 feet, tapping the channel 10 feet under bottom. The gravel streak is thought to be from 500 to 600 feet wide. The gold is coarse. The ground is hard cement and requires a mill to save the gold.

The American Hill gravel properties will be extensively worked this season. They are all drift propositions.

Forest, March 28th, '98.

Siskiyou.

Standard: Twenty-two men are at work on the Sound Money and California Queen claims at Rock gulch. The 5-stamp mill crushes ten tons per day. The vein of the California Queen is 2 feet wide. This was tapped at a depth of 300 feet with a tunnel 500 feet long.

At the Hunter & Smith mine on Cherry creek the ledge is 6 feet wide and of good grade.

The American Bar mine, near Hornbrook, is being worked energetically under the management of J. Main.

A Chicago company is negotiating for the ground along Yreka creek, between Yreka and Hawkinsville, to work it on an extensive scale. The plan is to secure the land from the Blake field down to Shasta river, and mine the ground on each side of the stream up to the Yreka town site.

Fort Jones *Reporter*: Gordon & Eaton found a 4-foot vein of good ore near Hawkinsville.

Winslow & Hunlon are taking out good pay at the Boles mine.

Bratt & Morgan have opened a 5-foot vein

near Fort Jones. From 100 pounds of ore they netted $400.

Gearhart & Gosney are developing the Morgan mine.

The Corey mine has a tunnel 275 feet on the vein, which averages 20 inches and is fair grade.

News: Andrews & Son, in Scott valley, are running their hydraulic mine. The Nesbitt & Hunter drift mine is paying well. Hossick & Milne are developing a quartz property on McKinney creek. McCauley & Son are opening up their drift mine.

Journal: The Deadwood quartz mine, owned by J. C. Schroeder of Yreka, is showing well. Mr. Schroeder has not yet concluded what kind of a mill to put up to replace the one destroyed by fire some time ago.

Austin & Co. are still running on the tunnel through the Humbug mountain, near Yreka. They are in nearly 200 feet, and find the quartz stringers getting wider, and the base rock softer. Paying ledges, such as the Schroeder, the Cherry creek, and the Humbug creek mines are in the same range of mountains.

The work of pumping the Quinne & McConnell mine, Klamath river, is progressing rapidly, and will soon be hoisting pay gravel.

The Benz Bar claim, near Honolulu, is being worked day and night with a large force, and pay gravel is realized.

Trinity.

The Mooney Con. M. Co. at Lewiston will work their three properties by the elevator process. The larger part of these flats have never been worked.

Work is progressing on the dredger at Poker Bar. J. S. Forrest of the Risdon Iron Works is superintending the building. The boat will be 70 feet long when finished and draw 2½ feet of water.

Tuolumne.

Independent: The Rappahannock is down 850 feet.

Operations have resumed at the Gold Bug mine.

A strike in the Dead Horse was made between the 1400 and 1500-foot levels — the greatest depth of any mine in the county.

Twenty men are employed on the Lafayette mine, near Big Oak Flat.

The Ribbon G. M. Co. are thoroughly developing their property near Summersville. The company is composed of San Francisco people.

The *Magnet* says the Sierra R. R. Co. has men at work near Cooperstown prospecting for coal. At a depth of 54 feet they struck a seam of indifferent quality 3½ feet thick. The company intends setting up machinery at Cooperstown, where they will bore to the depth of several hundred feet.

The Santa Ysabel mine is earning a little more than operating expenses. The latter item includes all development and similar expenses. During January the mill ran eighteen days. In February the supply of water was larger, and the mill ran its twenty stamps practically the entire month, and earned net between $2000 and $3000.

The ore is being taken chiefly from the Central ore chute and the Knox & Boyle shaft, and is running anywhere from $8 to $15 a ton.

The question of water supply has become such a serious problem to mines that the App and Rawhide among others are considering the question of electrical motive power. Should this power be adopted by mines situated near the Santa Ysabel, an amount of water could be obtained by the Ysabel more than sufficient to meet all necessities.

In the Foote mine, near Robinson Ferry, a tunnel is being run on an 8-foot vein. The ore assays well in free gold and sulphurets.

The crosscut tunnel on the Ribbon Rock has reached 463 feet.

The Alabama mine, near Quartz Mountain, has closed down indefinitely.

NEVADA.

The *Reveille* says T. J. Bell sold his interest in the Ione M. Co. and resumed operations on his placer claims.

G. Veatch received $15,000 for his Union canyon mine, near Ione.

The Boston Nevada Copper Co., in Mason valley, has 400 tons of ore ready for smelting and has also uncovered a new deposit.

The Golden Eagle, near Winnemucca, made a shipment of $60 ore. It went 14 per cent lead, thirty-four ounces silver and two ounces gold.

The Chainman Co., operating at Ely, has bonded the Golden Revenue mines, four in number, adjoining the Chainman property, for $60,000. They have also bonded the Jupiter series for $25,000. There are about forty-eight men working in the Chainman property.

A vein of ore 50 feet in width so far as prospected, and assaying over $5 a ton gold, is said to have been developed in the old Lady Bryan mine in Lyon county.

A company organized by Jeffersonville, Indiana, capitalists to be known as the Oriental & Belmont Con. M. Co. will develop properties at Eureka. Sinking begins at once, and machinery will be erected as rapidly as needed. P. C. Donovan will be Supt.

It is stated that G. Simmons, discoverer of the turquoise mine on Timber mountain, has disposed of $67,000 worth of gems to New York jewelers, and that he has two cutters on the ground freeing the gems from extraneous matter.

R. H. Aiken, who bonded the Aiken group, near Pioche, has begun work. The claims are to be prospected thoroughly.

Ex-Mayor Davie of Oakland has put men to work at the Olinghouse mines on the Washoe tunnel to advance it 50 feet in search of the ledge that shows on the surface. About 280 feet of work was done on the tunnel several years ago, but was abandoned for want of funds.

OREGON.

The Courtney & Kramer mine, seven miles from Grant's Pass, crushes three tons per day. The result of a run of fifty hours yielded 13⅘ ounces of amalgam valued at $135. The Jupiter G. M. Co. have begun extensive operations in the same neighborhood.

The Grants Pass *Journal* says that quicksilver is soon to be produced from the Black Butte mines in Lane county, seventeen miles from Cottage Grove, by the Black Butte M. Co. The ore runs as high as 56 per cent mercury. A 30-ton furnace condenser and dryer is in course of construction. The property is expected to be in operation the coming season. The property consists of 1040 acres along the top of Black Butte. The cinnabar ore mixed with a decomposed quartz crops out for 4000 feet. Six cuts and two tunnels have been made, from which assays were made showing from 3 to 40 per cent quicksilver.

The Oro Fino M. Co. near Merlin has contracted to furnish sixteen cars of ore to the smelter. From a shipment made some time ago the company realized from one ton $1760.

The first $10,000 payment on the California and Hidden Hand mines in the Cable Cove district has been made by J. W. Connors and associates to Cabell Bros. The terms of this transaction were $100,000 cash, the mill to be in operation by December 17, 1897; $10,000 March 17th, $10,000 June 17th and $10,000 September 17, 1898.

La Bellevue mine, near Baker City, will commence crushing ore April 15, with a capacity for fifty tons daily.

R. D. Hume has bought the Huntley mine, a copper property, for $20,000. The mine is fifteen miles from the mouth of Rogue river.

The Greenback mine, near Grant's Pass, make a cleanup of $3500.

WASHINGTON.

The Bull Frog Co., near Loomis, has sunk to the 100-foot level. Drifting from the 100-foot level will crosscut the ledge.

The Golden Zone Co. on Mt. Chapaca is making good progress in ore of high grade. Work will shortly commence on a new tunnel 100 feet lower than the present work.

The Eureka G. M. Co. has put men to work on the North Star claim at Republic. Work on the Pittsburg has begun under the same management. Ledge matter is beginning to show up in the Tom Thumb, assays of which give $3.10 in gold values. The second carload of ore from the Republic mine returned $114 per ton.

A half interest in the Lost Lode claim at Republic was sold to F. H. Oliver for $25,000 cash.

BRITISH COLUMBIA.

(Special Correspondence).—E. Blewett and associates have made final payment on the Treasure Mountain property, near Vancouver. At 125 feet the vein assays from $20 to $28, mostly copper. The last shipment of 200 tons picked rock from the Van Anda, at Van Anda, netted $8000. The Raven mine, near Van Anda, has also made a successful first shipment.

The Channe Co. have purchased four claims on Hansen island. A trial shipment will be made from them shortly.

Vancouver, March 26th, '98.

Spokesman-Review: The Monita, near Rossland, has been purchased by the War Eagle C. M. Co. for $94,000. The Monita was stocked for $750,000, and market quotations have been from 12 to 15 cents. The balance of the purchase price of the Whitewater mine, near Whitewater, was paid last week. The price is not made public, but it is generally understood that the transfer was made on a basis of $450,000. The Whitewater has paid in dividends to date $154,000, and was shipping 200 tons per week when this deal was made.

The mill of the War Eagle is to be operated by electricity, also a 40-drill compressor, and a 150 H. P. hoist.

The Le Roi Co. will put in an electrical plant to furnish 300 lights for surface use.

The tunnel on the Dardanelles, at Kootenay, has reached 204 feet, showing a lead from 3 to 6 feet wide, assaying $22 per ton.

The Gertrude claim, near Rossland, has been sold to a company for half the stock of the new company, with $40,000 to be placed in the treasury for development purposes.

A car of concentrates from the Fern mine at Nelson realized $60.78 a ton.

M. Alexander, representing an English company that bonded the Mollie Hughes group near New Denver for $40,000, is reported to have paid the money and put twenty men to work.

ALASKA.

The Postmaster-General awarded the contract for carrying the mails from Juneau to Weare, at an annual compensation of $56,000. Weare is at the junction of the Yukon and Tanana rivers, and the route is 1618 miles. The contract provides for two round trips a month for four years, beginning July 1, 1898. The principal intermediate points on the route are Dawson City and Forty Mile, Canada, and Circle City, Alaska.

THE KLONDIKE.

In last week's issue was mentioned the luring tales that find their way into the press dispatches, "special correspondence," "private letters," etc., regarding the wonderful richness of some hitherto unheard of region. The following, which appears with much prominence in the San Francisco *Call* of the 31st ult., is a good example of this kind of thing:

RAMPART CITY, Nov. 16th, '97.

Friend Ralston: You will be surprised if this letter reaches you. Remember when I left you at St. Michael on the 27th of last June. You were bound for Dawson, and all those at St. Michael were very much excited when Clarence Berry arrived there from Dawson with so much dust. You left on the Bella on the 28th of June, and on the following day I left with the natives in a skin boat for Port Clarence, that being as far as I could induce the natives to go. From there I got another native with a skin boat to take me to Kotzebue sound, but I could not induce him to go up the river unless I gave him whisky. Not having the requisite, I was obliged to look for some one else. Not having much trade in their line, I was finally obliged to give them what tobacco I had for our own use.

Jack Hayes had a gallon of alcohol and some drugs, and with this we made about four gallons of whisky. With this we finally induced the natives to continue up the Kubuck (Kowak) river as far as we wanted to go.

Our original intention was to go as far as Fort Cosmos, but before we got there the Indians told us two white men had gone up before us and were on a small stream where they were getting plenty of gold. We thought this too good to be true, but concluded to follow on around to where they were. Imagine our surprise to find them with not less than $25,000. The mosquitoes were nearly hell, and as we had not much provisions we started in to do our best. Our fondest hopes were more than realized, and in twenty days we cleaned up with, I should think, about $50,000.

This was about August 25, and our two friends were thinking of coming down the river in the hopes of getting to St. Michael before the last boat would leave for San Francisco. They started, but we concluded to stay ten days longer and take our chances in getting out. Two days after they left a native who had been farther up the stream hunting deer came back with plenty of fresh meat and a nugget that will not weigh less than twenty ounces. I gave him the last plug of tobacco I had for it. I hated to part with the last plug, for gold was more plenty now than tobacco. We went on up the creek. The native led the way to a small riffle, where he found it, and we commenced work and found it in such quantities as to make us almost crazy, often getting ten ounces to the pan. In ten days we washed out $50,000. Oh, how we hated to leave! We had only fifty pounds of flour left, and very little tea and sugar, so we started down to the mouth of the river, and when we got there the weather was getting cold. Ice was making fast in the Kubuck, and the natives told us we could not go down until it froze up. They also told us that it was as near to go to the Yukon as to the mouth of the river, and they agreed to go with us if we gave them some tobacco and whisky when we reached the Yukon.

Here we stayed with them until October 15, when we started, coming by the way of Zanes pass and reaching Mulatto after fifteen days' traveling. There we got some flour and a little tea from a half-breed trader, and I also got some tobacco for the natives, but no whisky. The natives would not go any farther, so I stayed there until November 10, when, hearing that there were plenty of supplies at Rampart City, we started for this place, which we reached in five days.

Skink Miller told me you went down the river on the J. J. Healey, so I suppose you are in San Francisco now. I hope so, and I hope this letter will reach you. I intend to stop here until the river opens and then go down to St. Michael and purchase supplies from the Commercial Co., or else go to San Francisco. I have plenty of dust now to charter a vessel with and take back all the supplies I want. If you should receive this letter wait in the city until I arrive, as I will be down on the first boat from St. Michael, and we will return as soon as we can charter a boat and purchase supplies.

Hoping this will reach you, I send it with the mail that is going to leave here to-morrow. I am paying $50 postage on it, but that is nothing, as I have better ground than any on the Klondike, as you will say when you see it. Kotzebue is the richest spot on earth.

Hoping this will find you all well, I remain, your friend, JOHN ROSS.

That is the kind of stuff that sends men pell-mell up there. The man who buys a lottery ticket is a model of sober business discretion compared with the one who is influenced by such statements to make a similar attempt to achieve such alleged success.

Major L. H. Rucker, U. S. A., who has returned from Dyea, says that five officers and twenty men of the relief expedition are at Haines Mission. They arrived there March 24th. They start on an exploring expedition to find a suitable all-American route to the Yukon. Captain Abercrombie, who heads the party that will explore the Copper river country for the War Department, will go north this week. The Government pack train that went north on the Lucille is still encamped at Dyea. The bulk of the supplies that were to be taken to Dawson are at Dyea. It has not yet been decided what disposition will be made of them. The Dalton trail party took its supplies out of those on the relief expedition.

Thousands are working to cross the Chilkoot and White Pass trails. All who have the proper grit will get over by the time the lakes and rivers open. Five acres at Sheep Camp are piled up close with outfits that have been hauled from Dyea. They are piled on the snow and left without guard until the owner gets all his goods to Sheep Camp. Nothing is stolen and the packers never worry about their goods. Some of the goods taken up last winter are being dug out of the snow. If a man does not want to haul his outfit there are three ways by which he can get it to the summit. There is a train run by electricity, a rope and tackle arrangement and a gasoline engine method. By these means seventy-five tons a day are handled. There are men, Indians and dogs on the trail in large numbers.

UTAH.

The Mercur mill at Mercur treats 300 tons daily. The Mercur mine has paid $922,000 in dividends.

Capt. DeLamar will have spent more than a million dollars on his Golden Gate mine and mill before a wheel is turned in the latter. For less than seven acres of ground he paid the Mercur Co. $237,500.

At the McKinley, near Mercur, the ore body is being penetrated by shaft and tunnel. The vein averages 4 feet in thickness, the center of which contains silver chlorides.

The Ophir Hill mill at Mercur will be enlarged this spring.

Cinnabar ore is being extracted from the Florence claim of the Geyser-Marion.

Last week's shipment of copper ore from the Ajax amounted to $3000. It was the third this month.

Near Frisco the Galena Co. has reached a depth of 200 feet and started a drift to crosscut the ore chutes. The material in the drift assays $5 in gold; some lead and silver is encountered.

M. Anderson made a discovery of a 12-inch vein of 40 per cent copper in the Frisco district.

The El Dorado, of Bingham, made its first shipment of ore. It makes a good showing in copper, lead and silver. Traces of gold are also shown.

IDAHO.

Considerable development has been done on the Golden Fleece and Star mines near Placerville. The ledge averages from 8 inches to 4 feet and the ore runs from $20 to $80 per ton in gold.

The new tunnel of the Mammoth, near Wallace, will approximate 4000 feet, and in that distance will cut at least three ledges, besides the one on which the Mammoth is located. The Mammoth will have nearly a mile on the main lead, and will cut this lead 2000 feet below the apex.

The New England Dredge Co. is satisfied with the results of prospecting at Idaho City, and has ordered a dredge to be placed on the property at once.

The Twin Springs Co. has begun preparatory work with a large force on the property at Idaho City purchased from K. P. Plowman.

The Pueblo mine, near DeLamar, has reached 600 feet in tunnel and has a 5-foot vein, furnishing twenty tons per day. The ore mills $40 per ton.

The Blackbird mine, at Custer, made a clean up of $500 last week.

Upon petition of L. Cushing of Boston, Judge Knowles of the U. S. Court at Butte, Mont., appointed a receiver for the American D. & M. Co. The company formerly had an office in Butte, but moved to Gibbonsville, where the company has several mines, mills and general stores. It also has mines at Whitehall, Mont. The indebtedness is placed at $275,000, of which $45,000 is on an overdraft at Clark's bank in Butte, $8000 in wages and salaries and $12,000 on notes held by Boston parties.

The Granite G. M. Co., near Murray, has opened a vein that ranges from 20 to 32 feet wide.

South & Weidner have cut a 6-foot ledge of copper ore at a depth of 145 feet, near Blackbird.

MONTANA.

The Butte *Miner* says it is definitely stated that the Lexington mine will be started up in the next six weeks by a London company, and that efforts will be made to make it a copper producer. The property has been involved in litigation, and that, with the low price of silver, so affected the price of the property that it was sold to one of the London stockholders of the company for less than $60,000. The mine is down 1600 feet, and has miles of crosscuts and drifts; it has been one of the big silver producers of the camp.

The trial of the Butte & Boston M. Co. vs. the Montana Ore Purchasing Co. was concluded on the 25th ult. The plaintiffs asked $150,000 damages for ores alleged to have been extracted from the Michael Davitt mine by the defendants through the workings of the Rarus mine, owned by the defendants. The defendants admitted the taking of the ore, but claimed it was theirs, and not the plaintiff's. Their claim was that the ore bodies in the Michael Davitt were part of the Rarus lode, or zone, seeking to establish the broad zone theory. The plaintiffs denied that the Michael Davitt veins were part of the Rarus lode, and contended that they were separate and distinct veins, with their apex in the Michael Davitt ground. At the conclusion of the arguments to the jury Judge Knowles instructed that body to return a verdict for the plaintiffs, and find that the ores in dispute have their vein apex in the Michael Davitt claim and belonged to the plaintiffs. He left to the jury the question of fixing the amount of damages according to the value of the ore taken from the ground.

From three to five cars of ore per week are shipped from Pony. The producers are the Belle, Summit, Mountain Cliff, Willow Creek, Ned and Watseka.

Call: The Hull & Calhoun property near Philipsburg was sold for $6000 to J. A. Murray of Butte. He will immediately build a 30-ton cyanide mill and develop the mines.

The *Independent* says the number of mills reported in this State for 1896 was 548, with 6622 stamps. For 1897 it is estimated the stamps equaled 8000. In 1898, owing to the revival in mining, it will be within bounds to add 20 per cent in increased stamp capacity.

SOUTH DAKOTA.

The most pretentious mining publication ever issued in that region is the Black Hills *Mining Review*, of date March 21st, at Deadwood—a finely illustrated exhibit of the extent and richness of that section. At present there is employed in the mines there 3235 men, earning $4,000,000 per year. The *Review* says that the gold product for '97 aggregated $6,524,000.

The Chicago & Two Bit Co. has reached a depth of 230 feet in its shaft at Two Bit.

The Pyritic Queen was sold to the New & Black Hills G. M. Co. C. E. Hugh will be Gen. Mgr. Work begins at once. The property is in Two Bit.

It is stated that $50,000 has been taken from the Little Blue mine in the last six months. This property has been developed in a year and is now a regular producer.

The Rand gold output in February was 297,975 ounces, against 211,000 ounces in 1897

WYOMING.

Several promising mines are being opened near Gilman, showing veins 8 feet wide, carrying 60 per cent copper. On the placer fields of Independence mountain, covering an area of 75,000 acres, a hydraulic plant was erected last season, which made a three weeks' run before winter set in, cleaning up $14,000.

A gold discovery has been made near Sheridan on which exploration work has developed a vein 2½ feet thick; the ore assays from $4 to $140 per ton.

A body of free-milling ore 16 feet in width, from which the general average of nine assays returns $114.11, has been opened near Grand Encampment.

COLORADO.

The Amelia J. and Picayune, at Saw Pit, made their first shipment. This ore averages $40 per ton. Owing to the small cost of production the owners realize a profit of $25 per ton. The gross value of the product of the Corbett and Lizzie G. is from $40 to $50 per ton in gold and silver. The Corbett is ship-

ping eight cars per week. The Lizzie G. is producing six cars of ore weekly.

E. Parvin bought the Hart group, at Victor, for $35,000. The Uintah tunnel is shipping rich ore. The Strong divided $60,000 per month between its four owners for several months past. The Emma No. 2 is credited with shipments aggregating $200,000 in the past three months.

The Hines lease, on the Pharmacist, has come into a body of ore of 5 feet of quartz averaging $18 per ton. The shipments from the Zenobia last week consisted of 23 tons of $70 ore and 150 sacks of $150 ore. The Lillie is marketing ore at the rate of forty tons per day. The Little Pearl entered a 3-foot ore body which returns from $12 to $78 per ton. The monthly output of the Anaconda, in Gold hill, is given at 500 tons

E. C. Allen, Supt. Forest mine, in Wall-street Camp, Boulder P. O., will build a double-track tramway from the mine to the railroad—700 feet. Over 1400 feet of steel rope will be required to operate the tram. The Forest has a 6-foot vein of low-grade ore, which is being handled profitably. The mine is shipping thirty tons a week.

Reporter: The Virginius, at Leadville, maintains its regular output of silicious ores and work progresses on the New Monarch shaft of the company.

The Ibex M. Co.'s production averages 350 tons a day of oxide and sulphide ores. From the several mines in the Weston Pass district, 150 tons of silver-lead ores of good grade are shipped daily.

Eighty men are at work on the Resurrection mine and the monthly production is in the neighborhood of 2500 tons. It is calculated that this output can be maintained for the balance of this year.

Although the Banker's shaft, on Breece hill, is over 650 feet in depth, it is expected that it will take 250 feet additional before the ore plane will be reached, and probably 100 feet more before results will be obtained.

The Pyrenees shaft touched the lime formation at a depth of 1064 feet.

The U. S & B. C. M. Co. made the last payment on the Liberty Bell, Greenback and Lucky Girl claims, near Telluride, which it bonded last summer for $50,000. Since then it has purchased the St. James placer property. A new mill of a large capacity will be built near the Alleghany on the St. James placer, which will be connected with the mines by a bucket tramway 11,000 feet in length.

The tunnel being driven on the vein of the Waterloo group is in 500 feet and in its breast shows 7 feet of ore. Assays last week produced good results and the ore is being piled up for treatment when milling facilities are provided, which will doubtless be this summer. The group is under bond to the San Juan G. M. Co., which intends to equip it with all the improvements necessary, including a stamp mill. It is estimated that there is enough mineral blocked out to supply a 20 stamp mill for the entire season.

The Franklin mine, near Boulder, has given net returns of $25,000 the past year.

It is stated on reliable authority that the daily output of the Strong mine at Cripple Creek the past two weeks has been 300 tons of ore per day, and that this production is to be maintained for an indefinite period. Fully 90 per cent of the ore shipped is high-grade smelting ore.

The Big Four Co., near Leadville, are working sixty men. The production of the mine is not great as to tonnage, but the output is of valuable character.

The operations of the Lillie G. M. Co. for February show ore shipments amounting to 1058 tons, which carried a gross value of $41,328.62. The entire operating expenses amounted to $20,766.58, leaving a net profit of $20,562.04. The company now has a cash reserve of $72,000, $11,562.04 of which was added during February.

The strike in the Enterprise at Eldora shows a vein over 5 feet, which assays from $50 to $150 at 110 feet.

Twenty mines near Eldora are taking out shipping ore. The Revenge has ore worth $3 a pound.

The El Capitan on Copper mountain has been leased for $20,000 to Thayer Bros. of Cripple Creek.

The Cripple Creek placer, containing fifty acres adjoining Cripple Creek, has been sold for $10,000 to Colorado Springs men.

The *Telegraph* says with a fair prospect of the first three months of '98 showing a gain of over $2,000,000 in Colorado's gold output, compared with '97, the twelve months is admitted as most likely to show an approximate gain of $8,500,000. Reliable authorities anticipate that this year will be a good one for the State's mining industry. Their belief is stimulated by the knowledge that a great deal of new milling machinery is going into the various districts to utilize the ores of newly developed properties and old ones. The demand for mills and other machinery is keeping the dealers in such material busy, and the railroads are feeling the effects of this traffic as well as all other lines of business throughout the State.

A mill is to be erected on the Gold Pan group, near Breckenridge. The Hamilton M. & M. Co. is producing 100 tons of iron concentrates each month.

H. N. Brevourt is driving a tunnel at the rate of 10 feet per day in the Galena mine at Cripple Creek. It has reached a depth of 200 feet. Mr Brevourt holds a bond for $30,000 on the property.

S. B. Corrington, at the 120-foot level on the Sumpter, reached a body of sylvanite ore assaying from $200 to $300.

The Lord Fauntleroy has been leased for $30,000 for two years.

A trainload of ore from the Johnson, at Cripple Creek, was shipped last week. It was one week's output and averaged five ounces a ton. The daily output runs thirty tons.

The Annie is making shipments that run from eight to ten ounces per ton.

Gaffney Bros. shipped twenty tons of $40 ore.

The Orphan Bell is shipping sixty tons of ore per day.

The Pauper, at Victor, is outputting fifty tons per week. The ore is divided into two grades that run $125 and $60 per ton.

A third chute was cut in the fifth level on the Modoc. The ore is 2 feet wide and assays $80 a ton. The property has passed from the lessees, who netted $60,000 from their operations.

The Gold Dollar, on Beacon, sent out twenty tons that run twelve ounces.

Ore production at the Vindicator is going on at the rate of sixty tons per day, and a large force is employed in development work and blocking out reserves.

The Potvine and Vane are outputting ninety tons a week of $60 ore. Returns from a shipment of seventy-five tons gave a result of $69, and the low grade ore $45 a ton. Some high grade ore is being saved which is worth from $200 to $300 per ton.

C. Thurlow has secured control of the principal producers of sulphide ore at Rico, which includes the Logan, Wellington, Princeton and C. H. C. groups, and also the Chicago and South Park mines. The consideration amounts to over $200,000. He will thoroughly develop the properties as fast as possible, with the end in view of establishing a smelter at Rico for the treatment of pyritiferous ores.

The Twin Lakes Con. Placer Co., near Leadville, is establishing ditches and flumes for washing some of the bars of Lake creek this season, which will be done by hydraulic workings. The company own 4000 acres of placer ground and contemplate building a ditch next fall twenty-five miles long at an outlay of $150,000.

Liggett, Owens & Co. are shipping ore from the Garfield-Grouse at Cripple Creek at the rate of one carload per day, and the ordinary shipments run better than $100 per ton in gold, while the selected ore runs high. Last week a seven-ton shipment of sorted rock was sent out that runo $1000 per ton and five tons of sorted ore that runs $500 per ton. The fifth level is now being run at a depth of 310 feet, where the lead is found to be 4 feet in width and carrying an 18-inch pay streak. Nineteen days after resuming work the lessees cleared $6000 for themselves and paid an equal amount to the company. The March output will reach at least $1000 per day, and the lessees feel confident that their share of the profits will be from $12,000 to $15,000, while the company will receive a like amount. Ninety-five men are employed.

The Pinto Co. is pushing its shaft on the Free Coinage as rapidly as possible for a new level to be run at 450 feet, and a steady production is kept up from the 350 level.

The Burns is approaching a stage of steady production, ore being hoisted daily.

The Vindicator Co. has started crosscutting at 530 feet. Production is close to sixty tons a day, running from two to four ounces a ton.

A strike was made in the Village Belle, at Eldora, in the 165 level, of a 3-foot vein of high grade telluride ore.

Judgment for $11,431.25 was rendered in favor of the Percy Con. M. Co. against the Durant M. Co., the Compromise M. Co. and D. M. Hyman in the U. S. Circuit Court. A motion for new trial was overruled. The suit was brought to recover the value of ore alleged to have been extracted from the property of the plaintiff.

The deposits lately discovered near Pagosa Springs are attracting attention from prospectors.

At Blackhawk 510 stamps are crushing 600 tons per day, which, with the tonnage smelted, brings the total treated daily to 800 tons. The New York mill, of seventy-five slow-drop stamps, is to be changed to fast-drop stamps.

The Colorado Springs *Telegraph* says there is no other section of the district receiving so much attention from the prospectors as the foot of Battle and Squaw mountains at Victor. There are veins cutting off into the granite from the contact, and many are being developed through and on all sides of the town of Victor. The success of the Gold Coin Co. has been an incentive to exploiting these veins, and there has been much encouragement, particularly in the Fortune, the Spicer, the Santa Rita and the Home Run. The new plant on the Granite is in operation and shipments are going out at the rate of 500 tons a month. A high-grade shipment was made from the Gaffney on the old workings of the Pharmacist.

The Blue Bird Co. is shipping an average of 100 tons of smelting ore a month.

Courier: The ore body in the middle level of the Maud S at Georgetown has opened to 30 inches in width. There are being worked in the district twelve mines, of which six are shipping, the monthly output being sixty tons of smelting ore and 1000 tons of mill dirt. Employment is given to 150 men, the monthly pay-roll aggregating $12,000. There are three concentrating mills in operation.

For the first two and a half months of 1897 the camp of Ophir shipped forty-two cars of ore, and for the corresponding period of this year it shipped 150 cars.

The Shoemaker mine is treating ten tons a day, which average $25 a ton.

The Meldrum tunnel, which is to cut through the mountain to a point near Ironton, on the Ouray side, is being driven by a Scotch company. Work was commenced Jan. 15th at both ends of the line. It is now in about 400 feet at the Telluride end. The entire distance is between four and five miles, and to complete the tunnel will require about two years. The power plant at Pandora, where the tunnel starts at the Telluride end, has a large compressor at work, and work is being pushed rapidly. The dimensions are 12x15 feet, and it will connect with the railroad at Ironton. The distance from Telluride to Ouray is fourteen miles. The tunnel will cut the Tomboy, Japan and a number of other leads on the Telluride side and a number on the Ouray side. There has been no timbering done so far, the tunnel running through the solid rock. It has no connection with any mining property, being solely for transportation purposes.

At Cripple Creek the Uintah tunnel is making a daily output reported to average three ounces gold per ton.

Two cars of second-grade ore per day is the output from the Anna J. mine.

The Van Tilborg is producing ore running from $40 to $80 per ton.

Five cars of ore were shipped the past week by the Raven Co.

Shipments for the week from the Moon-Anchor have been 120 tons smelting and forty tons millstuff.

NEW MEXICO.

M. E. Becker, near Albuquerque, shipped six tons of ore to the smelter which returned 60 per cent lead, $5 in gold and $3 silver.

The Ortiz mine at Dolores is producing fifty tons of ore per day. Concentrators will be placed in the mills shortly.

Steen & Coble, near Amizette, began operations on the Iron Dike, a large vein of low-grade ore. They will push the work night and day.

H. H. Argue will begin active operations at hydraulic work and dredging near Elizabethtown this week. J. R. Beaty is preparing for extensive placer operations on Ute creek.

Work on the Dell mine at Hillsboro started last week.

Good ore has been encountered on the Scandia vein at Hillsboro.

R. C. Troeger has purchased the Bonanza mine in Sierra county and starts work next month.

S. M. Ashenfelter paid $1000 for an option on the Climax and Standard mines at Las Cabesas. The purchase price is $15,000. The ores of the properties average $25 per ton.

The Copper Glance mine in Taos county has been bonded to Boston and Chicago parties.

The Othello and Desdemona properties at Cook's Peak, operated by the Kansas City Smelting and Refining Company, produced 10,800,000 pounds of lead and 81,500 ounces of silver in 1897.

The Folsom group in Hell canyon has been bonded to Illinois parties for $30,000.

Z. Hirshberger is working fifteen men on his Pinos Altos property and shipping regularly.

The Modoc mine in Dona Ana county has resumed operations.

The Columbine mine at Red river has a 7-foot vein of $7 ore.

The *New Mexican* says that a sale has been made at Bland to W. J. Cartan of six Cochito claims for $150,000. The properties are the Good Hope, Hopewell, Allerton, Black Girl, Posey and Last Chance No. 2. The Good Hope property has demonstrated itself a successful producer. The Black Girl has produced milling ore. The vein on the Black Girl shows an average width of 10 feet for several hundred feet on the surface.

Davidson & Bell are working twenty-five miners upon the Golden Giant mine near Silver City. The drift on the 450-foot level has been run 70 feet, in ore all the way. On the Atlantic mine the fifth level was started at a depth of 417 feet. The south drift has been run 640 feet; the ore vein is 29 inches, solid and clean, requiring no assorting before shipment.

The Western Belle mine has a vein 14 inches in width running from one to four ounces of gold per ton.

Five cars of copper ore were shipped last week from the Santa Rita copper mines, the smelter at Santa Rita having temporarily suspended operations. Shipments of iron ore from Santa Rita average three cars per day.

The Hanover mine has opened a deposit of copper ore, at a depth of 60 feet, 60 feet long, 30 wide, and so far as developed 50 in depth. The ore averages 20 per cent copper.

The Confidence mine is producing eighty tons per day and making regular bullion shipments.

The Old Reliable M. Co. will begin in the near future to develop the Cullen group of mines, in South Santa Fe county.

ARIZONA.

(Special Correspondence). — The Elkhart group of mines and mill at Chloride, twenty-five miles north of Kingman, belong to the Security M. & D. Co. Theo. B. Comstock is Gen. Mgr. and Robt. J. Ferguson local Supt. The mine has considerable development from a 280-foot shaft on the vein. The ore is low grade, being a sulphuret of iron and lead, carrying gold and silver. The mill has a capacity of 100 tons per day. The high grade ores are shipped to the smelters.

The Schuylkill endlines with the Elkhart and is well developed, having a large quantity of ore in sight. This is under the management of F. W. Theis.

Along the same lead is the Tennessee, which is being developed by a company of which E. T. Loy is Mgr. This property has a shaft 180 feet in silver-lead ore, carrying some gold. The Merrimac, two miles south, is being developed by the same management.

The Minnesota is the oldest location in this section. It has undergone thorough development within the past few years by its owner, John Barry, who has a 10-stamp mill on the ground. The Minnesota is producing high grade silver-lead ore, running 400 to 500 ounces in silver. The low grade ore is said to run about sixty ounces silver.

The Oro Plata, in Tub Basin, belongs to J. W. Gerritt of Kingman, and is being worked by Clack Bros. & Poland, lessees. There is a shaft in 150 feet, from which development work has gone on extensively. The ores are a sulphide of iron and lead, carrying gold values, and is a smelting proposition, though there are low grades which might be milled.

At Mineral Park there is renewed activity. The Buckeye is being developed and lessees are working on various properties. The values in Mineral Park ores being principally silver, and not generally adapted to the milling processes in vogue, the output at present is restricted to high grade ores.

The Temple Bar Con. M. Co., which owns extensive placer gravel banks on the Colorado river, north of the White hills, is putting in machinery for a steam pumping plant, by which they will get direct action of the water from the river against the gravel banks without the use of a reservoir. These improvements are being put in under the management of H. J.

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Delamer. The property is on the Nevada side of the river. The plant is expected to be in operation by July. The Santa Ana and the Alamo Cos., both under the same management as the Temple Bar, have similar holdings in the same locality. WASCORT.

Kingman, March 22nd, '98.

Young & Simpson have opened a paying placer property twelve miles north of Dos Cabezas. The ground is said to pay $10 per ton. The gravel will be worked by milling process.

The El Colon mine near Hermosillo shipped three carloads of silver and gold rock, averaging 400 ounces silver per ton.

The Golden Wonder mine, near Payson, has a 4-foot body of free-milling ore which will average $20 per ton. The ore body was found at a depth of 300 feet.

D. Snyder is working a copper property, near Tucson, and making regular shipments carrying from 27 to 32 per cent copper.

Republican: F. F. Childers is developing the Grand Prize mine near Payson, where he is running a 3-stamp mill, the concentrates being shipped to Pueblo via Phœnix at a cost of $51 per ton. These concentrates run from $115 to $125 per ton, gold principally. Mr. Childers hopes to secure a smelter of small capacity. There is plenty of lime in the vicinity of the Grand Prize and wood is nominal in price. The shaft is down 265 feet. On the Golden Wonder mine near Payson the lessees struck a 5-foot vein of free-milling ore at a depth of 200 feet. The property is bonded to M. Derrick, who expects to put up a mill.

The Lone Star group, comprising eleven claims in the Globe district, were bonded to Qualey Bros. of Chicago, who have done enough work to make it clear that a 30 or 50-ton smelter can be operated successfully. Several 100-foot shafts are down. D. A. Carpenter of El Paso says it is a settled matter that the smelter will probably be built a few miles from Safford. By April 15th it is expected 100 men will be connected with the development of these claims.

The Ingersoll mill at Tyson's well is running on ore from the Guadalupe M. Co. The Guadalupe is an old mine that was abandoned many years, until taken hold of by the present company. The new owners have struck at a depth of 100 feet a 3-foot ledge that will average $35 per ton.

The Grand Canyon M. & D. Co. is preparing to extract gold from a number of bars in the Colorado river, in Mohave county. P. Rifenberg has charge. Several other companies are preparing to develop these gold deposits, which extend almost 100 miles along the river above Bonnell's ferry.

The Santa Ritas is shipping ore.

Two of the main shafts in the Congress mine have reached a depth of 1800 feet, a third shaft having a depth of 1000 feet. The newest of the shafts has been sunk through a ledge of ore hitherto unexplored. Values and quantity are found almost uniform throughout, the ledges averaging 4 feet in width and carrying $20 to the ton. The iron pyrites stripped of quartz run $160 to the ton. About 100 tons a day are worked, a cyanide plant taking up the values passed by the concentrators. More extensive reduction works are to be put in soon.

The Rainbow mine, Mohave county, on the 130-foot level struck a body of ore that will average $40 per ton. Three carloads of high-grade and 400 tons of second-class ore are on the dump.

The Azurite mines near Tucson have 4000 tons of ore on the dump running from 8 to 12 per cent copper and from $4 to $17 per ton in gold. The high-grade ore will be shipped until the company erects a smelter.

The President mine, in the Santa Maria section, has two shafts in ore, one to a depth of 180 and the other 90 feet.

The Bain group in Pima county is showing copper ore.

The cyanide plant at the Little Jessie mine, Chaparral gulch, Yavapai county, will soon be increased to 100 tons capacity.

The Atlanta mine in Chloride district, Mohave county, will sink a new shaft below the old workings. Thirty tons of ore shipped, yielding satisfactory returns.

A strike is reported in the Norma mine, near Kingman, of an 8-foot ore body showing silver and gold.

S. B. McConnico and associates of Boston secured a lease and bond on the Altata mine, near Chloride. As soon as the old shafts are cleaned, sinking and drifting will be pushed. If development results satisfactorily, a concentrating plant or a copper-matting furnace will be erected, according as the character of the ore shall determine.

Phelps, Dodge & Co., owners of the Copper Queen of Bisbee, purchased a controlling interest in the Detroit Copper Co. of Clifton for $1,000,000. They have rebuilt the plant and doubled production. The Arizona Copper Co. at Clifton has increased the capacity of its plant and is producing about ten tons per day. This property is owned in Scotland. Its stock could have been bought for 75 cents per share a few years ago, and it is now selling at $25.

The Golden States Co., near Tucson, reports the opening of a breast of 12 feet high grade copper ore.

California capitalists are prospecting with diamond drills for coal near the Gila river, east of Solomonville. Should they succeed, it will revolutionize copper mining about Clifton, Morenci and Globe and greatly cheapen the cost of reducing other ores in that region.

The Spangler mines, which are yielding rich ores, consisting of ten claims, are six miles from Garden station. There has been considerable development work done. About 200 tons of ore have been milled. There are seventy-five tons of second grade ore on the dumps. A clean-up of eight tons of second grade yielded $40 per ton.

The Mammoth mine, near Tucson, started with fifty stamps last week. The tramway is 2¾ miles in length. The double compartment has a depth of 600 feet. There are 4325 feet of drifts. The ore body is 52 feet wide. The mine has produced about 200,000 tons of ore. It is producing 175 tons of ore per day.

The Mohawk Co. is running thirty stamps. The workings have reached 300 feet in depth. In the 300 level the ore is 23 feet wide.

MEXICO.

Two Republics: Thirty miles southeast of Hermosillo, in Prietas district, are situated the Grand Central and Colorado mines, purchased a year ago by an English company for over a million dollars. Englishmen are said to be negotiating for the adjoining mines, the Mina Prietas and Crestone. Both combinations have mills, each treating about 160 to 180 tons of ore per diem. The ores of these mines run from one to three ounces in gold per ton.

News comes from the Sahuayacan gold mining district that two mines are in operation there, employing 100 men. A third is not operated for lack of machinery. Sahuayacan is 350 miles west of the city of Chihuahua, near the dividing line of Sonora and Chihuahua.

Jones & Shankland, representing Kansas City capital, purchased a half interest in a placer tract near Alamos, Sonora, for $10,000 gold. They will install machinery to lift the gravel and water. The water course will be changed and the machinery will be of large capacity.

On the upper Yaqui near San Antonio F. J. Toussaint, Gen. Mgr. Yaqui River M. Co., has a concession of forty miles of river and one-third mile of bank on each side. A dredge has operated satisfactorily for nine months. Another dredge is to be purchased at once of 2500 yards capacity each twenty-four hours. Mr. Toussaint has started for San Francisco.

The Kansas City Smelting and Refining Co. is building a smelter at Villa del Carmen, Coahuila, for treating gold, silver, copper and lead ores, with a capacity of 100 tons a day.

The Zaragoza mine at Suaqui Grande shipped nine bars of silver bullion 950 fine, weighing seventy-five pounds each.

Wadsworth & Wilbur have taken a bond on the Sevillano mine near Willard station for $12,000 gold.

The Copper Queen Co. commenced work on the reduction plant to work the ores of the Nacosari mines. Eventually the plant is to reach a capacity for handling 1000 tons daily. There are 100 men working in the mine on development and a large body of fair grade copper ore has been developed.

LOWER CALIFORNIA.

San Diego *Sun*: A strike is reported in the Cristo mine at Jacalitos of a vein 4½ feet wide, the ore running $200 to the ton. Three tons netted $625.

The Trinidad M. & M. Co. is a new company about to begin operations at Jacalitos, forty miles from Ensenada. The company is composed principally of owners of adjacent properties in the district, who consider it advantageous to concentrate the expenditure of capital. The officers are: C. B. Richards, president; O. J. Crewe-Read, vice-president; L. R. Works, secretary; L. A. Blochman, treasurer. The capital stock is $400,000.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Wm. Nolden and C. Kaber, in the Aureole mine, near Oleta, Amador county, to deposit tailings in Deadman creek, and from George Beattie, in the Beattie mine, at Georgia Slide, El Dorado county, to deposit tailings behind the dam of the Gold Bug mine, in Canyon creek, gives notice that a meeting will be held at room 59, Flood building, on April 11, 1898, at 1:30 P. M.

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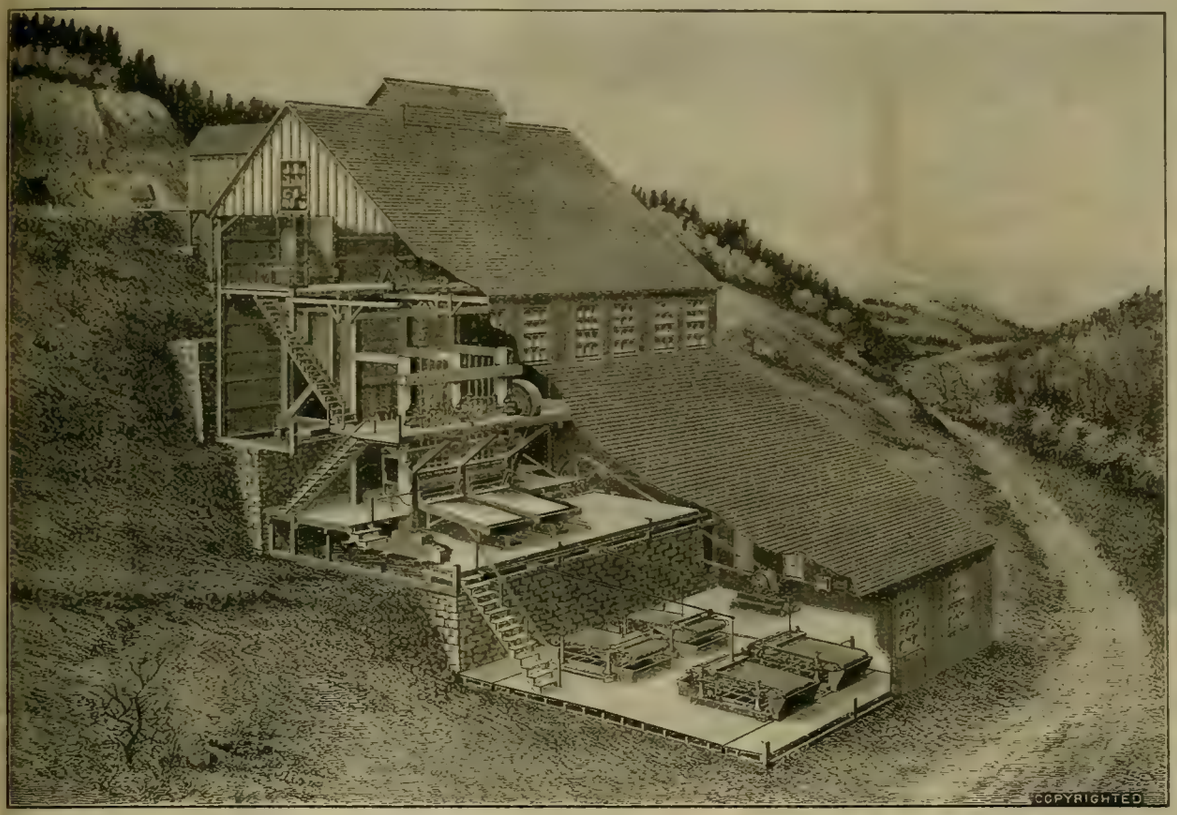
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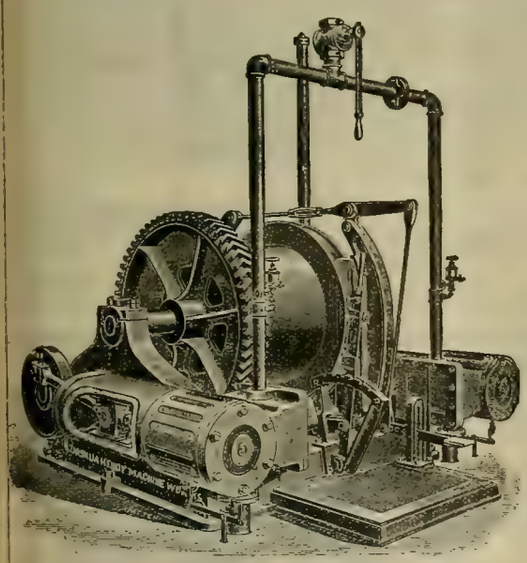
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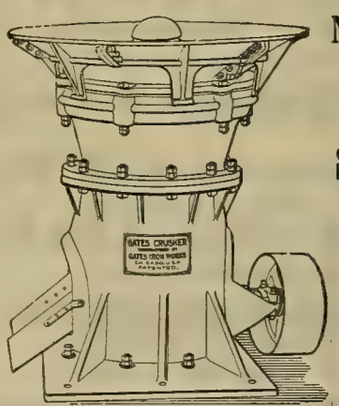


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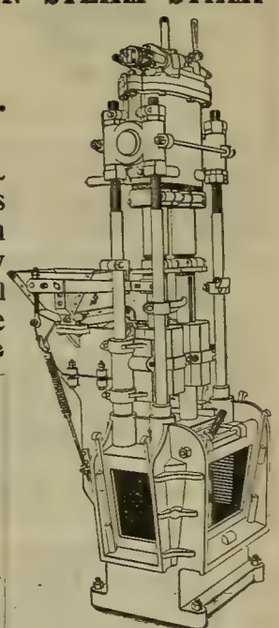
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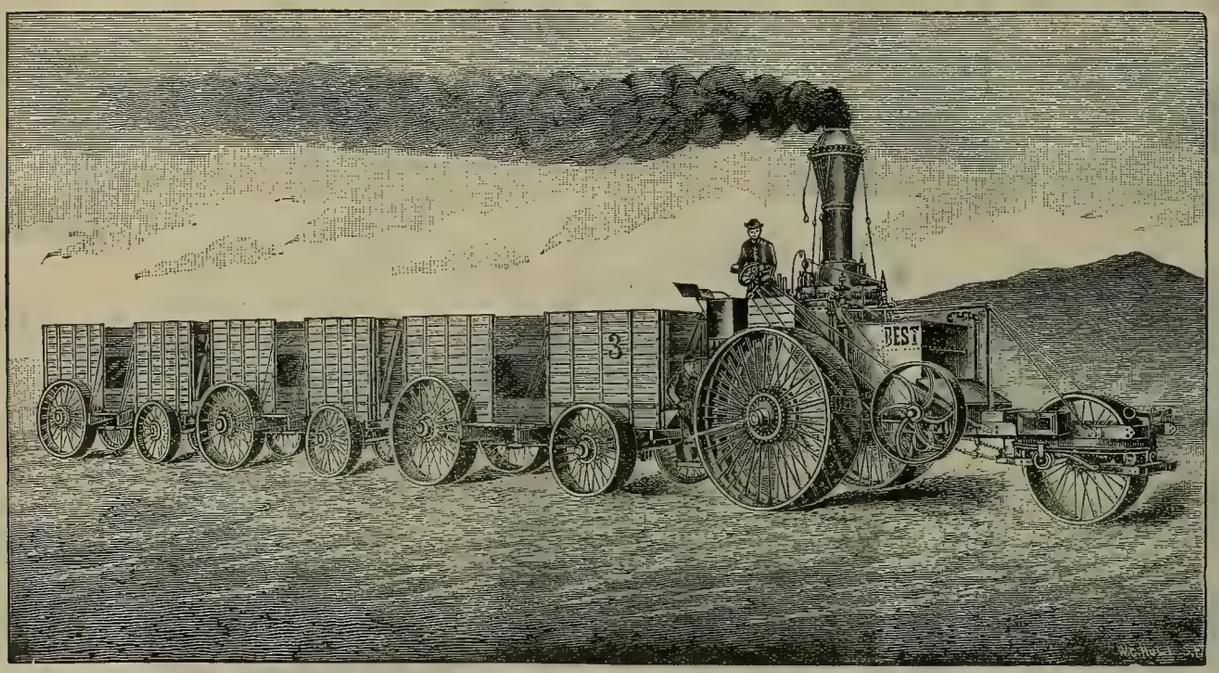
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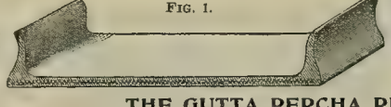

FIG. 1.


FIG. 2.

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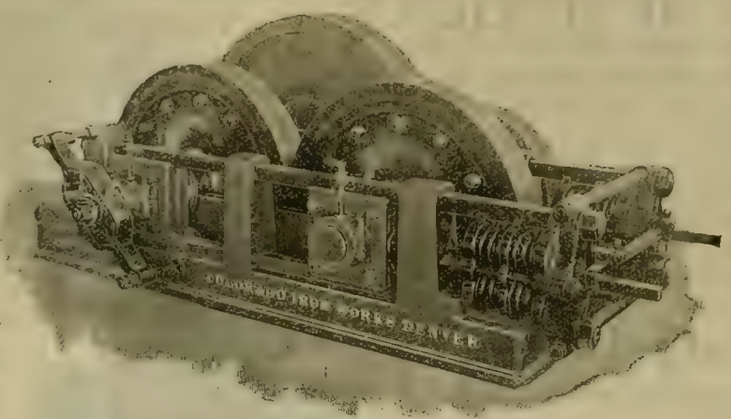
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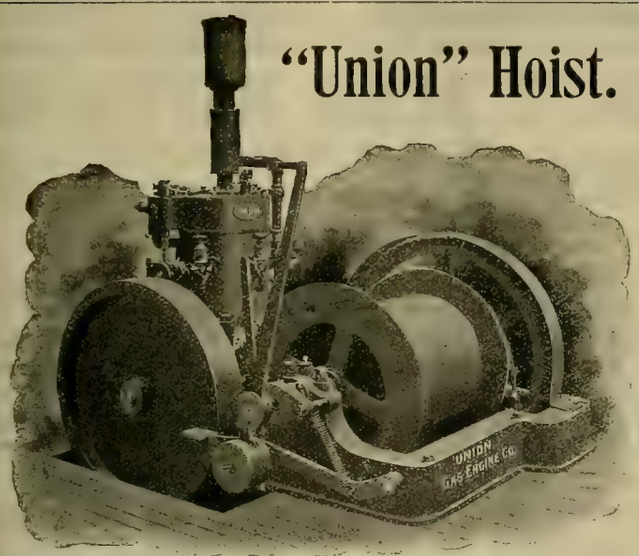
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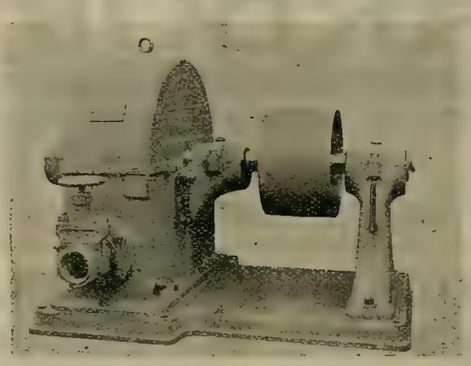
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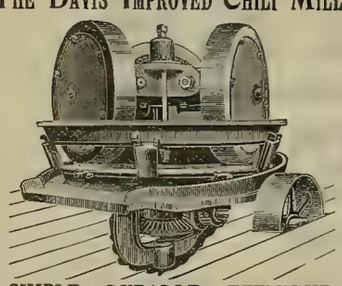
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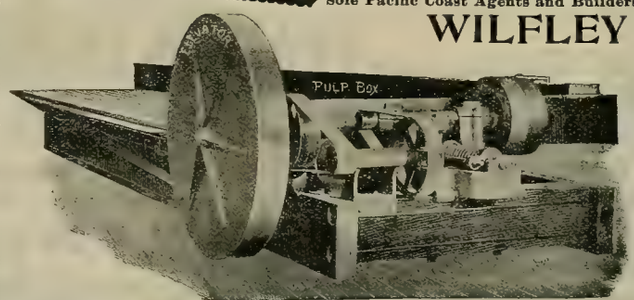
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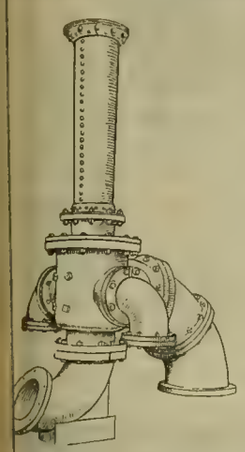


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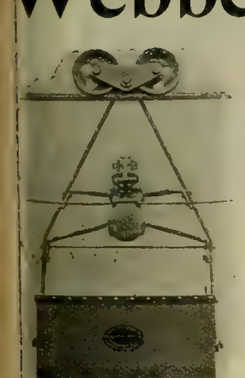
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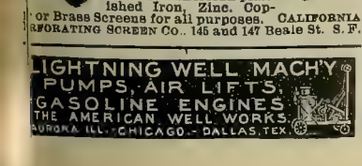
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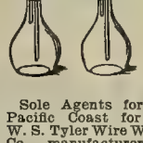
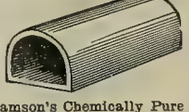
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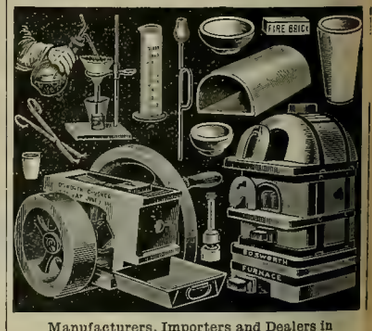
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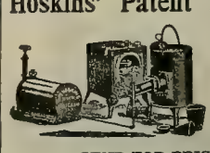

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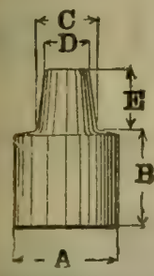
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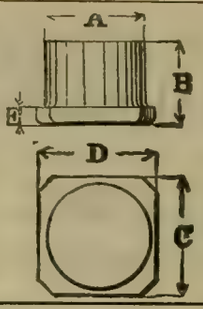
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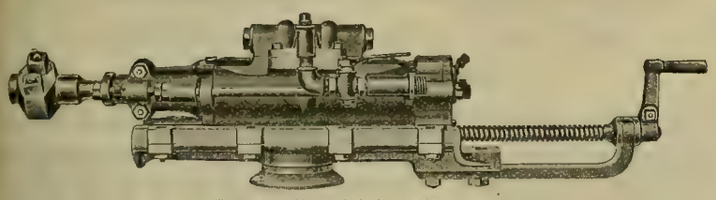
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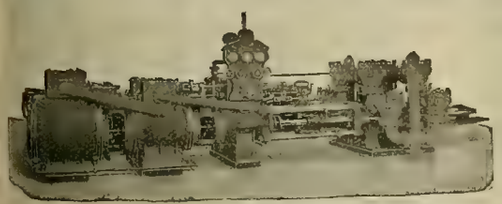
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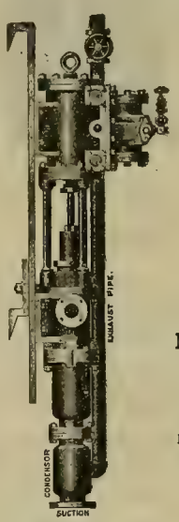
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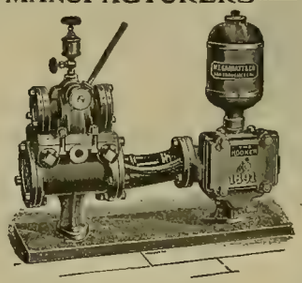
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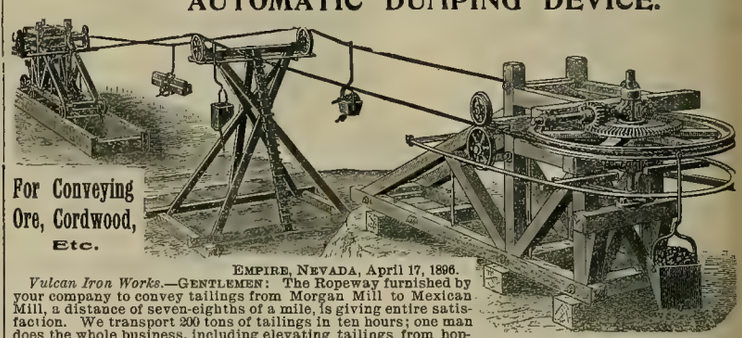
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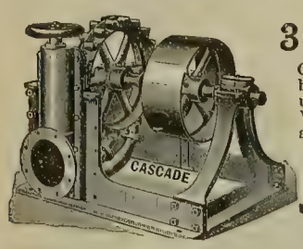
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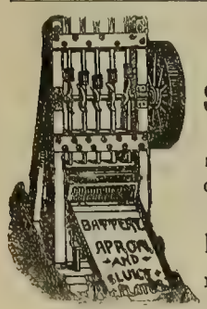
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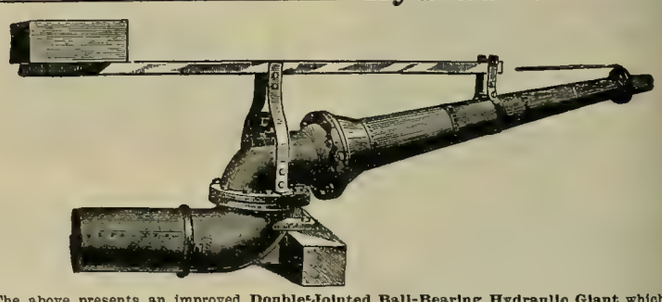
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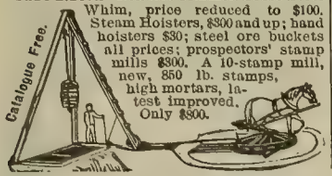
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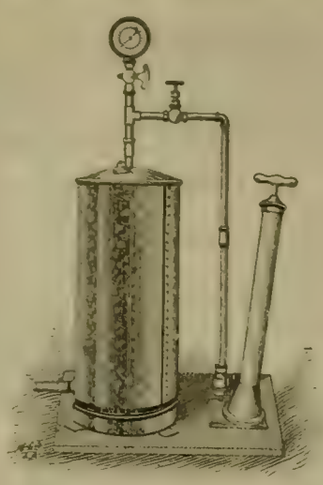
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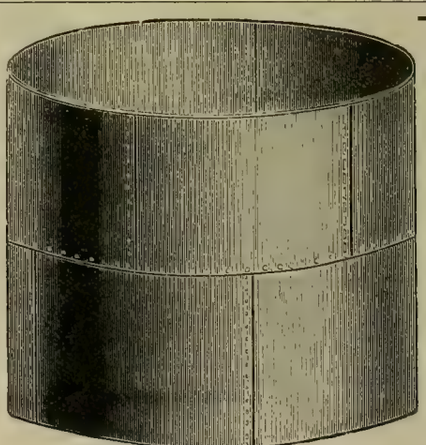
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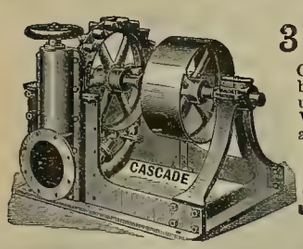
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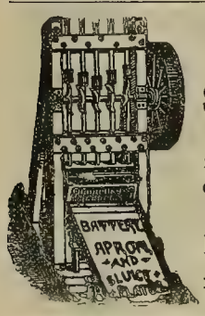


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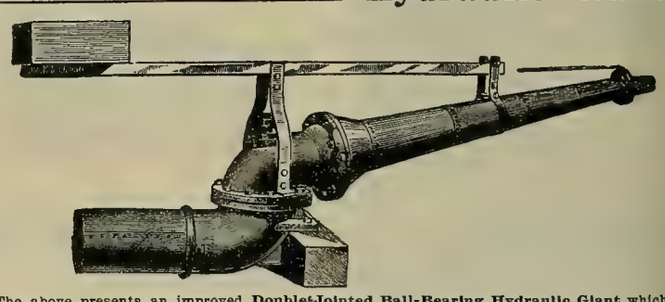
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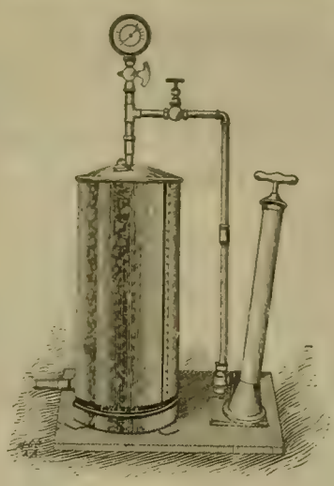
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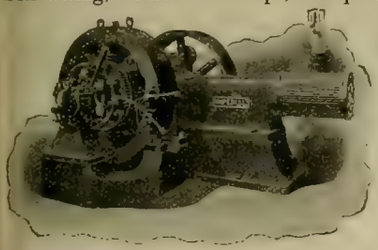
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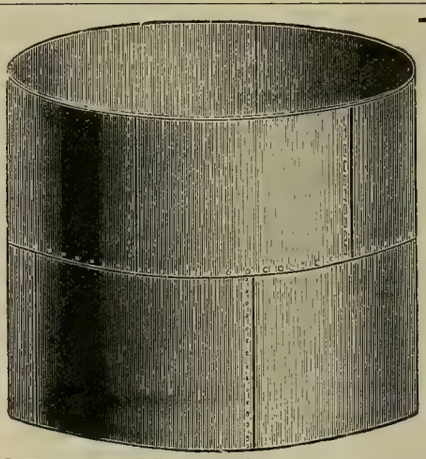
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Market Reports.

The Markets.

SAN FRANCISCO, March 31, 1898.

General trade has been fair for the season, although some lines report a falling off in the volume of goods going out. The dry weather scare is making dealers pursue a conservative course in buying. It is conceded by the more conservative in trade that crop damages by frost and dry weather have been exaggerated, and that the outturn of fruits will be fully up to last year's, but cereals, hay, beans, etc., will be less. In April there will be heavy buying for shipment to points on the upper tributaries of the Yukon river. It is the opinion that these purchases will aggregate over 30,000 tons of goods. Mining implements will be bought in increased quantities. There is considerable buying for shipment to Siberia. One vessel is loading for the Amoor river and three or four others will be dispatched in April. This trade promises to increase in the future.

In the local money market there is nothing to report. The demand for funds is light, which makes gilt edge paper sought by banks. City collections are said to be close, but country collections are fully up to former years. The opinion prevails that the demand for money will be light throughout the spring and summer months in the absence of any speculative movement. There will be heavy disbursements in this city in April and May by dealers and large incorporated companies going into business in Alaska. There is one company alone that will forward 15,000 tons of goods. These disbursements, together with heavy remittances of gold bullion from the Yukon and its tributaries, will add very materially to the large supply of moneys in bank. The East reports that the flow of gold from Europe to this country continues heavy, and it looks now as if the aggregate since February 25 will reach fully $50,000,000 by the last of April, unless the premium on gold in Europe should advance to such figures as to make it a losing game to bring it in.

New York Silver Prices.

NEW YORK, March 31.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	25 9-16	55½
Saturday	25 9-16	55½
Monday	25 9-16	55½
Tuesday	25 11-16	55⅝
Wednesday	25 11-16	55⅝
Thursday	25 11-16	55½

	Copper.	Lead.	Iron.	Tin.
Fri.	11 87½@12 00	3 75	9 75@12 00	14 35
Sat.	11 87½@12 00	3 75	9 75@12 00	14 30
Mon.	11 87½@12 00	3 72½	9 75@12 00	14 30
Tue.	11 87½@12 00	3 72½	9 75@12 00	14 27½
Wed.	11 87½@12 00	3 72½	9 75@12 00	14 27½
Thur.	11 87½@12 00	3 72½	9 75@12 00	14 27½

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	6
Commercial Loans, prime	5
Call Loans, gilt edged	4@4½
Call Loans mixed securities	5@6
Mortgages prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.82
London Merchants	$4.81
London Sight Bankers	$4.85
Refined Silver, per oz., 1000 fine	55½
Mexican Dollars nominal	44½@45

SILVER.—The market has been steadier the past week with a slight advance towards the close. The East reports a continued fairly free outward movement. English advices state that the call seems to be improving for shipments to the East Indies. It is stated that there is a strong probability that no move will be made to change the present status of silver in India either by imposing a higher import duty or establishing a gold standard. The demand for silver for China is light, here at the East and in Europe. There is only a normal call from other demand sources.

MEXICAN DOLLARS.—The market is very dull and no improvement is looked for until the new crop tea and rice seasons open in China.

COPPER.—The market continues to hold strong in all positions, at the East and abroad. The consumption is simply enormous compared with that half a decade ago. This year promises to be largely in excess of 1897, which was the largest in the history of the trade. The production of copper in the United States is increasing. It is stated that Arizona's outturn last year was 25 per cent over 1896 and this year's promises to be fully 50 per cent more than 1897. There was received from Seattle the past week 1287 ingots.

Our market is quoted as follows:

Ingot casting, jobbing	13¼@—
Ingot " wholesale	13 @—
Sheet copper	16¾@—
Bolt	¼ and 5-16, 20c; ⅜ and larger, 16½

TIN.—Our market is fairly firm for pig, but weak for plate, owing to competition between American manufacturers. The East reports fairly steady markets.

The market is quoted in jobbing lots as follows:

Pig	4 75	@	5 00
Sheet	....	@	6 50
Pipe	5 30	@	5 80

LEAD.—There is a fair demand, both here and at the East. Any improvement in the Eastern demand is met by a slight stiffening in prices, which shows that the market is well in hand.

Pig, per lb., jobbing	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " " light, "	4 00@—

SHOT.—Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

QUICKSILVER.—There is a fair demand for both home and shipping. Exports the past week included 200 flasks to the west coast of Mexico.

Our market is quoted at $40 for domestic consumption and $36@37 for export to the west coast of Mexico.

IRON.—The market is steady to firm for foreign, but easy for American. Poor crop prospects for wheat in this State are against vessels coming here at low outward charters, consequently slightly more freight has to be paid. The East reports active but easy markets.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—There is no perceptible change in cargoes in any position. Poor prospects for the wheat crop in this State are against cheap coal charters. It is the belief that domestic coal will rule firm. The Oregon Improvement Co. is to be reorganized and its coal mines worked more energetically. Receipts of coal for the week ending Tuesday were as follows in tons: Puget sound, 6700; Nanaimo, 5640; Coos bay, 1015; Comox, 1250; total, 14,605.

Wellington	$10 00@— —
Greta	6 50@— —
Nanaimo	8 00@— —
Gilman	6 00@— —
Seattle	6 00@— —
Coos Bay	5 00@— —
Cannel	10 00@—
Egg, hard	13 00@— —
Wallsend	9 00@— —

TO ARRIVE—CARGO LOTS.

Australian	6 25
Liverpool Steam	7 00
Scotch Splint	— —
Cardiff	— —
Lehigh Lump	12 00
Cumberland, bulk	9 00
Egg, hard	10 50
West Hartley	7 25

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	— —	@	— —
" spot, in bulk	11 00	@	— —
" in sacks	12 00	@	— —
Cumberland	10 00	@	— —

POWDER.—The market is strong, with a free movement reported.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

PLATINUM.—The market is steady. Our market is quoted in a jobbing way at $16 per ounce and for scrap $11 per ounce.

ZINC.—The market is firm. Our market is quoted at 10@15c, according to thickness.

ALUMINUM.—The market is steady. We quote in jobbing lots at 45@50c per pound for ingots.

BORAX.—The market is strong at full figures.

The market is quoted as follows:

Refined, in carload lots, in barrels	7¼
Refined, in carload lots in sacks	7
Powdered, in car lots, in barrels	7¼
Concentrated, " in sacks	6¾

Chemicals.

There is nothing new to report in our market. The demand is restricted largely to small jobbing lots, which are still met in nearly every line by purchases made last year. The East reports quiet markets, with no changes in prices along the line.

CYANIDE OF POTASSIUM.—The market is steady. Our market is quoted for chemical pure, 32 cents per pound for jobbing lots, and 29 cents for carloads.

SULPHURIC ACID.—The market is firm. We quote in a jobbing way at 1¼c per lb for 66%.

NITRIC ACID.—Our market is reported firmer from store at 6¼@7c per pound in carboys.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

BONEASH.—Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

BLUE VITRIOL.—Our market is firm at full figures.

We quote in a jobbing way at 4c per pound.

SPELTER.—The market is firm.

We quote our market in a jobbing way at 5c per pound.

BISMUTH.—The market is barely steady. Our market is quoted in a jobbing way at $1.40 a pound.

SODA ASH, 58% (Le Blanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—The market is quiet at 2½c a pound from stores.

NITRATE OF SODA.—Our market is quoted from store at 4c for 95%.

PHOSPHORUS.—The market is steady. We quote in a jobbing way at 70@75c per pound.

Mining Share Market.

SAN FRANCISCO, March 31, 1898.

The market went off slightly under the lead of Sierra Nevada the forepart of the week under review, which sold down to $1.50. At this figure there was quiet but stronger buying, which stopped the decline, and caused a firming up; but the rest of the list only steadied up. There was a gradual appreciation until Sierra Nevada sold quite freely at $1.90 and $1.95, with a few straggling offers at $2. The other shares did not advance much, which makes dealers rather skeptical of much of an advance, at present, over that figure, although bull points are out for $2.50 a share. The improved price is said to be due to air connection in the upraise in that mine. This connection, it is claimed, admits of a free flow of pure air, which will allow exploiting the ore found on the Riley tunnel level, besides admitting more expeditious work in pushing that tunnel to the west. The work in several other mines on the Comstock lode ought to begin to attract attention before long, yet the market, before anything worthy of special mention is struck, is liable to go off, particularly the prices of shares that have advanced the most. This decline is liable to cause outside selling and a better concentration of shares. It is thought that if it does not bring about this desired result, then the work will be delayed and assessments levied, which will do the work. Of course, we are not in position to verify this belief, and it may be founded on the way it has been done heretofore. There is more quiet talk of draining the mines, with the view of resuming deep mining; but it is not at all likely this will be undertaken until some time in 1899, and in the meantime quite an upmove can be made, if desired, on ore developments above the Comstock tunnel level, for levels above the tunnel are by no means exhausted of the possibility of uncovering two or more large bodies of ore. This is made the more certain by reason of such a large area of virgin ground having been drained to the west by running west crossdrifts which tapped the large reservoirs of water in that direction, which years ago stopped work at a depth on the gold-bearing lode to the west. But it must not be forgotten by enthusiasts that even when ore is struck it will take time to put the mine in working condition for developing and extracting. The shifting character of most of the ground on that lode compels that man-escapes and a thorough system of ventilation be made before prospective work on the ore is undertaken, so as to guard against accidents met with in years gone by.

The market was strong and higher to-day for Sierra Nevada, with sales at $2 25. The entire line, but particularly the northenders, are firmer in sympathy. The advance in Sierra Nevada is said to be due to an improvement. It is reported on the street that in Ophir a diamond drill will be run to the west on the 1000-foot level. This ought to improve the shares in that mine. Contracts are being drawn up by the Comstock Tunnel Co. and the mines on the Brunswick lode, by which the mines there can be worked on that level, which will give interest to that lode, as the mines can be worked to much better advantage, and if good ore is found on that level then the mines on that lode ought to forge to the front, as a good investment proposition. Milling tests of Comstock ore make it a certainty that concentration is the best—a larger saving can be made by it and the ore milled at $3 a ton, instead of $7, as now charged. This method, we understand, is to be adopted there.

Official letters from the superintendents of the Comstock mines continue to be devoted to distances run and in some instances from points so worded that even a well-informed mining man might be deceived as to their exact location, which places outsiders at quite a disadvantage. As an instance, the following is an excerpt from one of the official letters filed this week: "From the incline upraise No. 1, at a point 60 feet above the sill floor of this level, from the south drift which skirts the footwall, at a point 178 feet in from its mouth, from the top of the upraise carried up 49 feet, from the south drift 100 feet in from its mouth, the upraise has been carried up 10 feet." This is about as clear as muddy water to the average operator, but it is only justice to say that outside operators do not care for ore or anything else—all they want is an active, fluctuating market, which makes it possible to draw out some money on their ventures. In Utah work is still continued in the northwest drift. It is in 72 feet feet and shows harder porphyry, with clay serpentine. Since the official letter from Sierra Nevada was filed advices have been received that the upraise 700 feet in from the mouth of the Riley tunnel has made connection above. This will admit of more active work on that level in the course of one or two weeks. They are still driving ahead in the north drift on the 900-foot Union shaft level. In Union work is confined to pushing ahead west crossdrift No. 2 on the 900-foot level. The material passed through does not show any change. They are still driving east on the 1000-foot level in Mexican. It is in about 870 feet. It is in porphyry showing clay seams.

In Ophir they are in 1000 feet in the west crossdrift on the 1000-foot level. The material is more favorable, but it is too soft to start a drill to run in several hundred feet to see what is ahead. The work on the Central tunnel level is to the west. No change is reported. In Andes they are still going west on the 175-foot level. The letter from the Con. Virginia reports they are still drifting east from points above the 1550-foot, 1650-foot and 1750-foot levels. A few tons of fair ore is taken out in the east crossdrift run above the 1650-foot level. In Gould & Curry they are still crossdrifting to the east from the 800-foot Bonner shaft level. In Savage they are still cleaning out and repairing main west crossdrift 190-foot level. No work in Hale & Norcross. Slow work is being made in repairing and placing timber below the 1100-foot level in the main incline in Chollar. They have stopped work in the winze from the 100-foot level and resumed work in the west crossdrift. They are crossdrifting to the west on the tunnel level so as to strike and prospect the ore found above. In Potosi the work is jointly with Bullion in the south drift. In Bullion the old Crœsus shaft is cleaned out and retimbered to a depth of 210 feet. In Alpha they are cleaning out and repairing the east crossdrift on the 500-foot level. In Con. Imperial the west crossdrift from the surface tunnel is out about 550 feet. No change is reported. A strong flow of water continues to be reported in the joint Confidence-Challenge-Con. Imperial west crossdrift. Some necessary repairs are being made. Nothing new comes from Yellow Jacket. No change is reported in the work in Belcher. About sixty tons of fair grade ore are raised a week. It assays about $25 a ton. Connection has been made on the upraise from the 830-foot level of Crown Point with the 700-foot level of Belcher. This admits of work being done to much better advantage in both mines. They are extracting a few tons of ore from the 900-foot level in Overman. They are still upraising from the 1100-foot level in Caledonia. They are raising about five tons of fair grade ore, assaying about $32, a day in Alta. The mine is reported as looking well. Owing to water coming in, it is said they stopped sinking the winze in Justice. When discontinued it was looking well. Work will be resumed when the flow abates.

From the Brunswick lode our advices are practically unchanged. In Occidental it looks as if they are developing a proposition which, when in order, ought to make the mine a dividend-paying proposition. On the 550-foot level they are still driving west. The east crossdrift No. 3 on the 650-foot level ran into a ledge which crosscuts 30 feet wide, which assays about $14 gold. This will pay the company, as it owns its own mill. On the 750-foot level they are still paralleling the ore found on that level. No change is reported in Chollar. The work is chiefly repairing. Incline shaft No. 1 is down 1165 feet. The work in Potosi is said to be looking well. From Savage, Gould & Curry, Best & Belcher and Con. Virginia no change is reported in the work or material encountered.

The following illustrates the changes of the week:

Mines.	Mar. 24.	Mar. 31.
Alpha	.....	.....
Alta Consolidated	.....	.....
Andes	.....	.....
Belcher	.....	.....
Best & Belcher	$ 31	$ 35
Bodie	.....	.....
Bullion	.....	.....
Challenge	.....	.....
Chollar	48	52
Confidence	.....	.....
Consolidated California and Virginia	79	88
Consolidated New York	.....	.....
Crown Point	.....	25
Exchequer	.....	.....
Gould & Curry	19	20
Hale & Norcross	.....	1 50
Justice	.....	27
Mexican	.....	45
Ophir	44	83
Overman	.....	10
Potosi	40	47
Savage	.....	29
Sierra Nevada	1 55	2 20
Union	41	53
Utah	.....	12
Yellow Jacket	.....	26

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied, Deling't and Sale.	Secretary.
Andes S M Co, Nev	45	5c	Mar 7..Apr 11..Apr 28	John W Twiggs, Nevada Block
Baliol G M Co, Cal	2	30c	Jan 26..Mar 25..Apr 18	R L Cheney, Mills Building
Best & Belcher M Co, Nev	64	20c	Mar 8..Apr 12..May 3	M Jaffe, 309 Montgomery
Bullion M Co, Nev	52	5c	Mar 29..May 4..May 24	R R Grayson, 351 Pine
Church G M Co, Cal	1	3c	Mar 23..Apr 29..May 23	A P Swain, 309 Montgomery
Con Cal & Va M Co, Nev	11	25c	Mar 8..Apr 13..May 3	A W Havens, 309 Montgomery
Con Imp M Co, Nev	40	1c	Mar 1..Apr 5..Apr 26	C L McCoy, Mills Building
Con St Gothard G M Co, Cal	13	15c	Mar 10..Apr 19..May 11	J F Holling, Crocker Building
Crown Point G & S M Co, Nev	73	10c	Feb 21..Mar 28..Apr 18	Jas Newlands, Mills Building
Fall River Con G Q Co, Cal	11	5c	Jan 15..Feb 25..Apr 21	A Lorsbach, 313-315 Front
Gould & Curry S M Co, Nev	83	15c	Mar 16..Apr 19..May 10	A K Durbrow, 309 Montgomery
Kate Hayes M Co, Cal	6	$1	Feb 25..Apr 5..Apr 26	H Pichoir, 320 Sansome
Marguerite G M & M Co, Cal	9	10c	Feb 19..Apr 6..May 2	F Mettmann, 225 Sansome
Marina Marsicano G M Co, Cal	13	9c	Mar 5..Apr 11..May 2	Charles Bovone, 217 Sacramento
N Bloomfield Gravel M Co, Cal	50	25c	Feb 25..Apr 6..Apr 27	H Pichoir, 320 Sansome
Occidental Con M Co, Nev	30	10c	Mar 9..Apr 12..May 4	A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	72	25c	Feb 24..Mar 29..Apr 18	E B Holmes, 309 Montgomery
Potosi M Co, Nev	49	20c	Feb 5..Mar 11..Apr 4	C E Elliot, 309 Montgomery
Richmond G M Co, Cal	2	1c	Mar 2..Apr 9..May 2	L R Tuttle, 328 Montgomery
Thorpe M Co, Cal	9	2½c	Jan 19..Feb 26..Apr 4	A F Frey, Phelan Building
Tuber M Co, Cal	1	50c	Mar 22..May 3..June 2	J W Pew, 310 Pine

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Rainfall and Temperature.

The following data for the week ending 5 A. M., March 23, 1898, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Minimum Temperature for the Week.	Maximum Temperature for the Week.
Eureka	0.18	28 23	43 09	36 53	30	52
Red Bluff	0.00	12 08	23.71	21 17	30	60
Sacramento	0.00	8 55	15 84	16.69	30	62
San Francisco	0 03	7.52	20.86	19 62	40	59
Fresno	0.01	3.71	9 97	8.16	30	64
San Luis Obispo	0.08	5.45	20.11	....	28	64
Los Angeles	0.22	5 02	16.46	14 62	36	64
San Diego	0.16	3.82	11.60	9.12	40	60
Yuma	0.00	1.65	5.35	2.87	38	72

San Francisco Stock Board Sales.

SAN FRANCISCO, March 31, 1898.

9:30 A. M. SESSION.

500 Best & Belcher	34	800 Ophir	77
600 Chollar	49	500 Potosi	45
700 Con Cal & Va	86	500 Savage	29
600 Gould & Curry	26	700 Sierra Nevada	2 05
100 H. & N	1 50	300 Silver Hill	04
600 Mexican	41	600 Union	49
100 Occidental	2 70	100 Yellow Jacket	26

SECOND SESSION—2:30 P. M.

500 Ophir	83	200 Yellow Jacket	26
900 Mexican	45	650 Sierra Nevada	2 20
500 Gould & Curry	29	900 Utah	12
500 Best & Belcher	35	300 Overman	10
500 Con Cal & Va	88	200 Justice	27
400 Savage	28	900 Union	53
1100 Chollar	52	100 Caledonia	25
600 Potosi	47	100 Occidental	2 70
200 Crown Point	25		

Assessment Notices.

CHURCH GOLD MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, El Dorado, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 23d day of March, 1898, an assessment (No. 1) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary at the office of the company, room 15, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 29th day of April, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 23d day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. P. SWAIN, Acting Secretary.

Office—Room 15, Nevada block, San Francisco, California.

CONSOLIDATED ST. GOTHARD GOLD MINING Company.—Location of principal place of business, 113 Crocker building, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of March, 1898, an assessment (No. 13) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker building, sixth floor, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. F. HOLLING, Secretary.

Office—113 Crocker building, sixth floor, San Francisco, California.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of March, 1898, an assessment (No. 13) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of March, 1898, an assessment (No. 45) of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 28th day of April, 1898, at 11 A. M., to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Room 22, Nevada block, San Francisco, California.

TUBER MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, Panamint district, Inyo county, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 22d day of March, 1898, an assessment (No. 1) of fifty (50) cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of May, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on THURSDAY, the 26 day of June, 1898, to pay the delinquent assessment, together with the costs costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

NORTH BLOOMFIELD GRAVEL MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, North Bloomfield, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 25th day of February, 1898, an assessment (No. 50) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of April, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on WEDNESDAY, the 27th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of March, 1897, an assessment (No. 83) of 15 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of April, 1898, shall be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 10th day of May, 1898, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of February, 1898, an assessment (No. 6) of one dollar ($1) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 24, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 26th day of April, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 19th day of January, 1898, an assessment (No. 9) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of February, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of March, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of delinquence in the above assessment notice has been postponed to March 12th, 1898, and the day of sale to MONDAY, April 4th, 1898.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

RICHMOND GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Butte County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of March, 1898, an assessment (No. 2) of 1 cent per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 406, No. 328 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

L. R. TUTTLE, Secretary.

Office—Room 406, No. 328 Montgomery street, San Francisco, California.

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BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey county, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the eighth (8th) day of March, 1898, an assessment (No. 64) of twenty cents (20c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twelfth (12th) day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the third (3d) day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada Block, No. 309 Montgomery street, San Francisco, California.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of March, 1898, an assessment (No. 11) of 25 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 59, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 59, Nevada block, San Francisco, California.

NOTICE OF ANNUAL MEETING.

MAMMOTH GARFIELD GOLD MINING COMpany.—Principal place of business, 120 Sutter St., San Francisco, California; works, in Old Diggings Mining District, Shasta County, California.

In accordance with the by-laws of said company, the annual meeting of the stockholders of the Mammoth Garfield Gold Mining Company will be held at the office of the company, rooms 50 and 54, 120 Sutter St., San Francisco, California, at 2 P. M., on Tuesday, the 5th day of April, 1898.

SAM. W. CHEYNEY, Secretary.

Dated March 14th, 1898.

DELINQUENT SALE NOTICE.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 9) levied on the 19th day of January, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Elizabeth A. Bassett	358	860	20 00
Elizabeth A. Bassett	359	800	20 00
Elizabeth A. Bassett	360	512	12 80
Elizabeth A. Bassett	361	308	7 70
Maggie Bassett	362	800	20 00
Maggie Bassett	363	800	20 00
Maggie Bassett	364	512	12 80
Maggie Bassett	365	308	7 70
A. F. Frey, Trustee	178	4,200	105 00
Wm. H. Schmidt	89	500	12 50
Wm. H. Schmidt	90	500	12 50
Wm. H. Schmidt	91	600	15 00
Wm. H. Schmidt	129	500	12 50
Wm. H. Schmidt	130	500	12 50
Wm. H. Schmidt	131	500	12 50
Wm. H. Schmidt	132	500	12 50
Wm H. Schmidt	133	512	12 80
Wm. H. Schmidt	134	640	16 00
Wm. H. Schmidt	248	694	17 35
R. Z. Johnson	393	700	17 50

And in accordance with law, and an order from the Board of Directors, made on the 19th day of January, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, room 44, Phelan building, San Francisco, California, on MONDAY, the 4th day of April, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

DELINQUENT SALE NOTICE.

FALL RIVER CONSOLIDATED GOLD QUARTZ Mining Company.—Location of principal place of business, San Francisco, California; location of works, Plumas County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 11) levied on the 16th day of January, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
L. Cassel	42	500	25 00
L. Cassel	46	750	37 50
L. Cassel	48	2	10
H. W. Brunning	49	1,000	50 00
J. Pilger	61	1,250	62 50
H. Meyer	26	1,111	55 55
H. Meyer	27	1,111	55 55
H. Meyer	28	1,111	55 55

And in accordance with law, and an order from the Board of Directors, made on the 15th day of January, 1898, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, 313 and 315 Front street, San Francisco, California, on THURSDAY, the 21st day of April, 1898, at the hour of 3 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

ADOLPH LORSBACH, Secretary.

Office—313 and 315 Front street, San Francisco California.

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DIRECT CURRENT DYNAMOS of 55, 150, 270, 350, 700, 725, 800, 810, 900, 1075, 1350, 1610 and 2500-light capacity. ALTERNATING CURRENT DYNAMOS of 750, 900, 1300 and 2000-light capacities. ARC DYNAMOS—20, 24, 30, 40, 50 and 60-light, both 1200 and 2000-candle power. ENGINES—12, 50, 75, 85, 100, 115, 125, 150, 175 and 200 H. P. BOILERS—50, 100, 250, 375 and 500 H. P. HEATERS—150, 1000 and 2000 H. P. STEAM PUMPS—All sizes.

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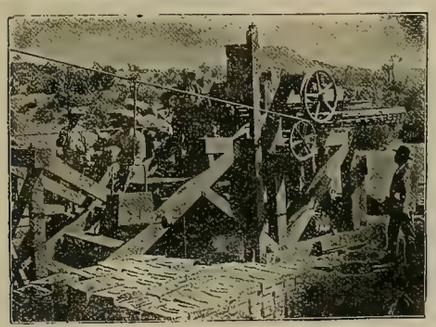
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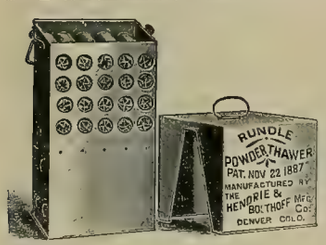
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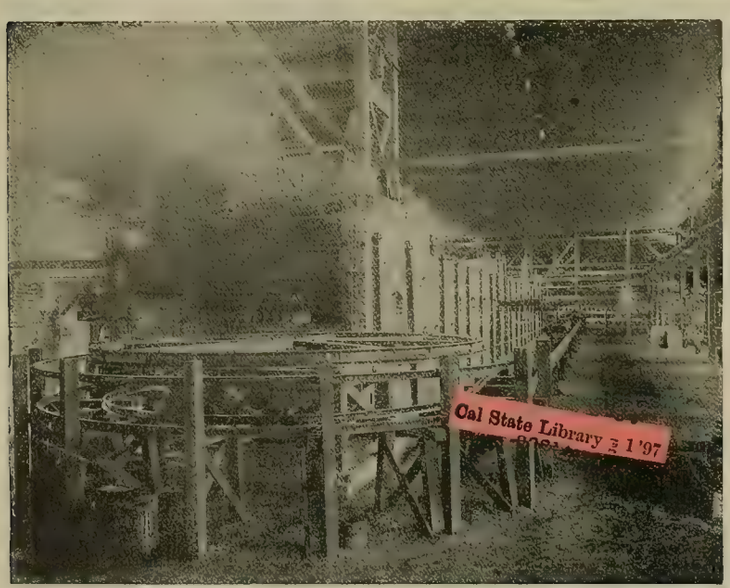
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FOR ROASTING, CHLORINATING AND DESULPHURIZING ORES.

Extracts from Letters Received from Mr. Philip Argall, Manager the Metallic Extraction Co., Cyanide, Colorado:

January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.

"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The **ROPP FURNACE** is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace): The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal. (two furnaces); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); Broken Hill Proprietary Co., Broken Hill, New South Wales (four furnaces); Puget Sound Reduction Co., Everett, Washington; Colorado Ore Sampling & Reduction Co., Cripple Creek, Colo.; Consolidated Kansas City Smelting & Refining Co., for the Arkansas Valley Smelting Works, Leadville, Colo.; Robert Lanyon's Son's Spelter Co., Iola, Kansas (two furnaces); Mountain Copper Co., Ltd., Keswick, Cal.

Catalogue on Application.

MINE BELL SIGNALS.

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FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco.

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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 1970.—VOLUME LXXVI. Number 15. SAN FRANCISCO, SATURDAY, APRIL 9, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Electric Installation in a Factory.



FIG. 5.—ASSEMBLY ROOM MOTOR.

The idea that electricity is a mysterious agent, with the workings of which only a few accomplished engineers are familiar, is dying out. With electricity the generating plant can be confined to a small building removed from the factory, or the power may be brought from the central station miles away; each separate machine may be driven by its own motor, or one motor may drive a section of shafting of any length; there are no idle pulleys or shafting to keep in motion and each machine thrown off diminishes the load on the motor and consequently the demand on the source of power—in other words, the consumption of power is proportional to the load. The speed of machinery driven by motors is constant and reliable, and, as there is no heavy engine, there is no vibration. This allows of a more finished product, as well as an increased output without increase in the plant. The motor demands no floor space. It may be hung, inverted, from the ceiling, be slung from it on a platform, be placed on a shelf, or attached to the wall. Two of these positions are shown in the illustrations. In the third the motor is placed on the otherwise unused cover to a stairway. One of the best examples of the advantages of electric drive is to be found in the factory of the Miami Cycle and Manufacturing Company at Middletown, O., where 1200 bicycles are built each week and 600 men are employed. In this case the best results have been obtained by connecting each section of shafting to its own motor. The factory is a three-story-and-basement brick building on the line of the Cleveland, Cincinnati, Chicago and St. Louis railroad, running between Cincinnati to Cleveland. It is about a mile distant from the station of the Middletown Electric Light and Power Company, from which the electricity is brought over wires strung on poles. It reaches the factory at 1000 volts and passes into six 40 H. P., one 20 H. P., and two 10 H. P. transformers, which reduce the pressure to 115 volts. The large transformers furnish the current for the motors; from the three smaller the lighting currents are run. The largest room in the factory is the machine and tool room, Figs. 1 and 2. This contains three lines of 3-inch shafting, each 210 feet long and each connected to a 20 H. P. motor. From the shafting belts are dropped to the different machines—lathes, drills, shapers, milling machines, emery wheels, planers, grinders, gear cutters, punch presses, hub machines and screw machines, in all eighty-four machines. In addition to these, an oil separator, two oil pumps and a high-pressure blower for the forges in the blacksmith shop are also driven by the motors. By means of friction clutch pulleys the three lines of shafting may all be connected together. The twenty-six machines in the drill room, Fig. 3—drills, grinders and milling machines, as well as a band saw, a circular saw and a lathe in the pattern room—are driven by a 10 H. P. motor. Another 10 H. P. motor operates all the machinery in the frame department.



FIG. 4.—ASSEMBLY ROOM.

The double polishing frames in the polishing room require two 30 H. P. motors. These are boxed in and are belted to two lines of 2½-inch shafting, each 93 feet long. Another 30 H. P. motor in this room drives a large suction fan which takes up the dust from the polishers. In the plating room two plating dynamos are driven by a 5 H. P. motor, and another 5 H. P. motor in the assembly room drives 110 feet of 2-inch shafting for a number of small machines and operates in addition a three-ton elevator. The electric system employed is the monocyclic system, an alternating-current system introduced by the General Electric Company, by which motors and lamps may be run from the same circuits, change of load on the motor circuits not interfering with the light of the lamps. The motors are induction motors, with no commutator, brushes, collector rings, or moving contacts.

Three small wires fastened to three binding posts bring the current to the motors, which run at a constant speed. They demand no attention beyond an occasional oiling and are for the greater part of the time called upon for much more power than that for which they are rated. As there is no jar on the floors from any steam engine, heavy pulleys and belts, all the machinery runs without vibration, and the manufacturers assert that to the absence of vibration and the constant speed of the motors, the satisfactory operation of their plant and the finish of their product is almost entirely due.



FIG. 2.—NORTH SECTION MACHINE ROOM.

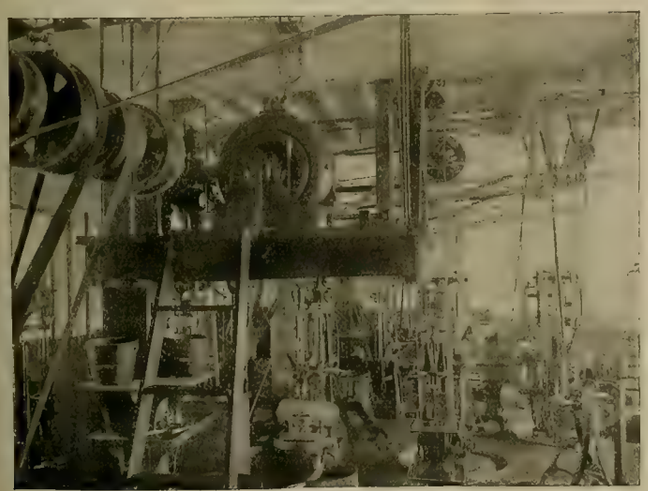


FIG. 3.—DRILL ROOM.

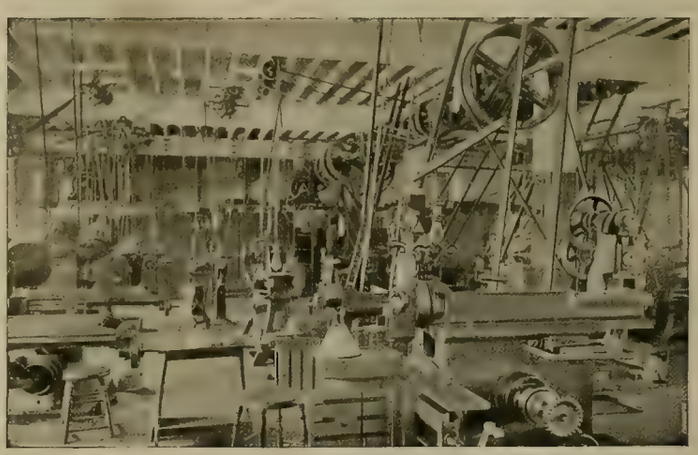


FIG. 1.—SOUTH SECTION MACHINE ROOM.

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....General Manager

San Francisco, April 9, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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In the article on the Gates canvas plant on page 392, the scales to which the sketches are drawn are given incorrectly. They should read: For Fig. 1, scale $\frac{1}{4}$ in. to 1 ft.; Fig. 2, $\frac{3}{32}$ in. to 1 ft.; Fig. 3, $\frac{1}{2}$ in. to 1 ft.

The fact that the United States Circuit Court of Appeals recently decided, in the case of a "crooked vein," that if the apex of a vein or part of it crosses the end line of a claim and then passes out through a side line, but curves back again into the claim and crosses its other end line, thus giving the owners of the claim no right to any part of the apex which is outside of their lines, makes the Arizona *Republican* think that it was possibly with a view to avoiding the consequences of such a decision that a prospector posted on a round chimney of quartz a location paper giving notice that he claimed "this lode or lead of quartz for a distance of 1500 feet in a wabbling direction from this notice."

In line with recent suggestions herein, showing the advisability of renewal of work on the Comstock, those in charge have made some practical movements this week in connection therewith, which it is believed will result in the settlement of the long-standing differences between the mining companies and the Comstock Tunnel Co. It is understood that the latter company has considerable capital at its command, and in case of any feasible arrangement whereby work can be renewed, sufficient capital can be forthcoming to insure active operations. The movement means a good deal to that entire section, including claim owners in adjoining districts, namely Silver City and American Flat.

Invitations to send representatives to the International Mining Exposition, to be held at Salt Lake City, Utah, beginning July 6th, '98, have been received by the California State Miners' Association and Governor Budd. Considerable interest is manifested in this gathering and it is in order to have California properly represented by miners. Secretary Johnson writes:

The broad scope and practical character of the organization has aroused deep interest among earnest thinking men throughout the country, and the coming gathering is destined to be recorded as one of the most important events in the history of the mining industry. We earnestly desire the active participation of every State and Territory in the Union in its proceedings, and urge the importance of selecting men most truly representing such branches of the mining industry as are prosecuted in the State, or those who take special interest in the subject.

Every county mining association in the State should send its full number of delegates to this meeting; and were California represented by one hundred delegates it would be but proportionate representation and would inure to the benefit of the commonwealth.

The Downieville, California, folio of the Geologic Atlas of the United States is received from H. W. Turner of the United States Geological Survey. This is uniform with the rest of the series previously issued, as heretofore noticed, this being the fourth of the California series. The folio is 19 by 22 inches, stoutly bound, containing an explanation of the geological map of the United States, of which this folio forms one sheet, followed by the description of the geographical, geological and mineral resources represented in that particular sheet, in plain, terse language especially appropriate for the public. There is a large amount of valuable information in each of these sheets, any one of which may be procured from the United States Geological Survey at Washington upon receipt of 50 cents. In these topographical map sheets, the water features are in blue, the hills in brown and the roads and towns in black. Following this is the same basal map with the geological colors, entitled "Historical Geology Sheet," and following this the same basal map printed in colors, called "The Economic Geology Sheet," with special attention to gold, iron, etc.; following is a structure section sheet, showing in colors the under formations with the latest geological ideas of those portions of the earth's crust. This work is done admirably throughout and is a credit to the office from which it originates. It indicates that the appropriation is being wisely spent, the work being of practical value to the public. It illustrates one way in which the taxpayer, upon whom all the expense of these things falls, can get good immediate results from the use of his money. In this connection it may be said that under Director Walcott's supervision the United States Geological Survey shows gratifying interest in the mining industry, which is of course as it should be. Indeed, were it not for the mining industry there would be but slight excuse for the existence of the Government Geological Survey, and this fact seems to be thoroughly appreciated.

Recent issues devoted to Cripple Creek, Colo., Mercur, Utah, the Yukon region and elsewhere, up-to-date and promptly furnished, show that the Geological Survey realizes that the greatest value of such publications lies in their prompt appearance. It is to be noted in this connection that a systematic plan in relation to this work, so far as California is concerned, has not been practiced, either by the State or by the United States Survey. Some time ago the State Mineralogist very properly proposed that a systematic survey be undertaken by this State; but so far nothing has come of it, though nothing would be of more value to the mining industry of California and its prospectors. Our California county maps are good; such United States Geological Survey sheets as those already issued of the Jacksonville, Smartsville and Nevada City folios, and, last, this of Downieville, are of great value; but even these are not wholly sufficient for the needs of the miners to-day. This matter has been taken up by more than one State Miners' Convention; but so far nothing has come of it. Where the United States Geological Survey is in the hands of a director who evidently desires to bring his work in touch with the wants of the people, and where the necessity of the work suggested herein is conceded on all sides, it would seem as though something tangible should come of it. While it may be said that the Government is supposed to deal only on general principles, and that what is being done now in this State—mapping the entire Sierra gold belt and publishing it in such convenient and valuable form—covers its duty therein, and that to do more would be to encroach upon the business of the prospector and the engineer, yet the idea is to aid such men, as well as the ordinary prospector and miner, so that all alike may be benefited. The cost of these general atlases now being published is from $5 to $11 per square mile. That of the Nevada City special folio, covering an area of 35 square miles, upon which every detail of geological and mineral data was outlined, cost $280 per square mile. This State contains about 160,000 square miles. Of this area the United States Geological Survey has topographically mapped about 36,000 square miles; of this latter area about 16,000 square miles have been geologically mapped and 800 square miles published.

From Washington and Madrid come notes of war. There are things worse than war, for instance the supine cowardice in a man or a nation that holds nothing worth fighting for, and that is willing to bide in dishonor. And yet, as Sherman put it, "War is hell!" It lets loose havoc and waste, and entails destructive expense. It spoils many for subsequent usefulness and hurts the nation by perverting its standards; for the virtues of war are the vices of peace. War is abnormal and its existence, like mob law, a spasm of effort that is only permissible by extreme necessity. The great justification—in fact, the only justification of war—is that it is the natural and inevitable resort in the absence of an international court of appeal. The difference between individuals and a nation (which is an aggregation of individuals) is mainly this: Where individuals disagree they resort to courts for arbitration. The court's decision rarely satisfies the defeated party, and doubtless in a majority of instances, if the defeated plaintiff or defendant were able, he would upset the decision of the court; but that is the law and such decision settles the case. An appeal from that decision would arouse the latent power of the government which lies behind every judge's chair. But with nations, each one is a law unto itself and there is no court of final resort, nothing to appeal to, except force of arms. It does not follow that every judge's decision is right in the case of two individuals; nor does it follow that the result or outcome of every war is right; but yet there is nothing left when argument and diplomacy fail but to resort to armed force. Of the merits of the question there can be, from the American standpoint, little doubt. As an integral part of a nation we of this coast are greatly concerned; while we will know little of the actual shock of battle, the conflict materially affecting the Gulf States and South Atlantic coast, yet even more intimately than in the slow-going days of the civil war will we feel the actual contact of blows. The result commercially will be stimulating to some classes of business and depressing to others. To nearly everything related to the mining industry the war will be a stimulus. Already it is noted in advance that, as in the days of the civil war, the gold of this west half of America was needed to supply war's sinews, so in these troublous sunset years of the century the great basic industry of the nation will be a material factor in assured victory.

A Question Answered.

In an extended list of answers to questions asked this paper in the issue of March 26th appeared the following from a San Francisco subscriber:

Take a car with a truck under each end and the car running on a level. The brakes are applied to one truck only. In one case that truck is on the front end of the car; in the other case the car is going in the opposite direction, so that the truck with the brakes applied is on the rear end of the car. In which case, if in either, would the brakes be most effective in stopping the car? In other words: Everything else being equal, would the brakes on the rear end of the car be more effective than on the front end?

Under date of March 30th, E. W. Liljegran, ex-Supt. Le Roi mine, writes from Rossland, B. C., in answer as follows:

In reply to "A San Francisco Reader," asking which truck of a car is most susceptible for stopping a car by applying a brake to the front or rear truck, I would say that brakes applied to the front truck are the more effective. When a car is in motion, and anything is applied to check its speed, the momentum of the moving body will persist in continuing in that direction, with specific gravity drawing down, making it possible to throw or place all the weight of a car and contents on the front truck. This can be demonstrated by using a rather high car, with trucks close together, set in rapid motion, and apply a powerful brake to the front truck. The result will be that the total weight of car and contents will not only pass onto the front truck, but clear over it. In fact, the car will end over, which demonstrates that, in order to get the greatest amount of friction, the appliance must be where the greatest force exists.

I have employed brakes on mine cars for switch-

ng, which is done by using open switches and a separate clamp brake on each front wheel applied by a foot lever from the rear end of the car. A loaded car of about one ton capacity, on good track, with a grade of .0036% (= ¼ of an inch in 12 feet) will, with a start, develop speed, with the carman standing on the rear, and have complete control by sudden pressure on the left lever. The left front wheel is impeded by friction, causing it to crowd the left rail. If desiring to turn to the right, apply the right brake and thus switch either way. With a track on the above grade, an empty car is pushed up grade simply by the carman leaning his weight against the car, avoiding laborious pushing. In this way, a carman can accomplish a greater amount of tramming, which is what all managers desire—economy.

Treatment of Slimes.

The very extensive descriptions of everything connected with the cyanide process in this paper for the last six years have made it a repository of information thereon. Of late much of practical value is received from South Africa, where cyaniding is conducted on an extensive scale, and progressive experiments are in constant process of acceptance or rejection. Much space has been accorded the operations and comments of Chas. Butters. On Feb. 19th he delivered an address at Johannesburg on the treatment of slimes, of which the following is a condensation:

Concerning the solution of what is known as the 'slimes problem," or the economic treatment of slimes produced by battery crushing, the newness of the work and the special opportunities and facilities I have had for carrying it on to a definite result are my excuse for bringing this subject before you, having been specially engaged on the slimes problem for the past three years. At the last meeting of the Chamber of Mines the president took the opportunity of stating the fact that the treatment of slimes was now an *economic success*. A statement from such an authority as the president of the Chamber of Mines of the South African Republic upon a question of so much economical importance to the mining industry marks an epoch in the metallurgical world that is well worthy of our consideration. * * *

To take up generally some of the difficulties encountered in treating slimes, it was found that if they were allowed to be deposited in dams for a comparatively short time, even for a few days, decomposition of the pyrites took place, and the question of their treatment directly as received from the mill thus became a subject for study. These researches have successfully resulted in the working out of a practical method, which consists essentially in the coagulation of the slimes in battery water by means of lime, their concentration by spitzkasten, and final settlement in continuous overflow vats or pits. The coagulation of the particles in clayey soils in agricultural operations by the addition of lime has long been known and practiced, and the use of lime for the flocculation and precipitation of the slimes suspended in battery pulp is but another adaptation of the same principle. The spitzkasten offered a ready means of making a partial concentration, and this was first carried out on a large scale by the erection of a spitzkasten at the Meyer & Charlton, the concentrated slime pulp being then pumped to the central works of the Rand Central Ore Reduction Co. Pointed stone settling pits were used by Mr. Williams at the Crown Reef, but have been supplanted by large rectangular spitzkasten, in which the pulp is concentrated from about 2½ per cent of slimes to 7½ per cent or 10 per cent, whence it flows to the collecting vats for final settlement. These collecting vats have in some instances continuous overflow pipes; in other plants intermittent filling and settling takes place; in some cases settlement takes place sufficiently fast to allow clear water to run off through the decanter. These settled slimes, containing about 50 per cent of water, are now ready for treatment. Another great advantage is gained by the separation of the slimes from the plate water, inasmuch as the latter is at once obtained in a fit state for re-use in the mill, and can in some cases even be gravitated back to the mortar boxes without pumping. The enormous saving in pumping costs and the economy of water are evident. This service, rendered by the cyanide works to the mill, illustrates the close relation of the various branches of gold-winning to each other, and emphasizes the need for the cordial co-operation of the mill and cyanide managers for obtaining the best possible results.

We have, so far, automatically and continuously collected the material from the battery water as it was delivered; but at this point the continuous operation of the slimes process stops, and, I am at present inclined to think, *always will stop*. The problem of extracting the gold from this partially liquid, sticky, clayey mass is now before us, and I will endeavor to lay before you some of the difficulties encountered and particulars of the manner in which they have been overcome.

In slimes we found a substance which could not be leached, or through which the solution would not percolate, but which we were obliged to wash by decantation. Washing by leaching or percolation means that one to two volumes of solution will dissolve and wash out a satisfactory percentage of the gold, and the final washing out of the dissolved gold is easily effected, because, in leaching, one solution displaces more or less completely the solution which has gone before it; and thus by successive washes, after having dissolved the gold, you *finally* obtain a wash which is comparatively free from gold. The sum of these successive washes does not exceed one and one-half tons of solution to a ton of ore, and the amount of solution which the ore will finally retain as moisture will not exceed, on an average, 14 per cent. With decantation, however, the washing of the material takes place by dilution, one wash does not displace another wash, but simply mixes with it; and, since the amount of solution or wash which this clayey mixture retains is from 40 to 50 per cent, the amount of dilution necessary to extract a satisfactory percentage of the gold necessitates the use as washes of from six to eight tons of liquid per ton of slimes treated. Consequently, in sand treatment, where 4 dwts. are extracted from one ton of sand, with two tons of solution, the average value of the solution is 2 dwts.; while in slimes treatment, if 4 dwts. are extracted from one ton of slimes, the average value of the solution would be 12 grains. In the case of the sands, the value of the first solution leached off might easily be 6 dwts., while with slimes the first solution would probably not be over 1 dwt. The result is that in the latter case you have a very large volume of much diluted solution to deal with, and at the same time the slimes retain as moisture nearly their own weight of solution. In order, therefore, that slimes may be economically treated, it is necessary to use a very dilute solution of cyanide, so that too much cyanide may not be lost with the residues when discharged and that too much may not be decomposed during treatment. How to obtain gold from this solution presents an entirely new problem to the metallurgist. Dilute solutions containing from 0.01 to 0.001 per cent of cyanide and from 6 to 24 grains of gold per ton had not hitherto been successfully handled.

A short review of the various methods that were tried at the Robinson plant with the object of overcoming these difficulties may be of interest at this point. First, let us discuss the solution and washing out of the gold: one of the most obvious methods to overcome the difficulties connected with this enormous volume of solution was to attempt the washing out of the gold by a smaller volume of solution than is ordinarily employed when working by decantation. At the Robinson a combined system was worked out—suction, leaching and decantation. The slime pulp, after being agitated sufficiently long to dissolve the gold, was run down upon a circular filter, contained in a 24-foot vat, with a raising and lowering stirring gear; while decantation was taking place on top, suction was applied below the filter cloth, and by this means about ten tons of slimes would be settled, decanted and sucked dry by a vacuum pump down to about 28 per cent of moisture, and would remain on the filter cloth as a layer 6 to 8 inches thick. The mass was then left in a tough, leathery condition—so tough, in fact, that it could be rolled up on the filter. Fresh solution was applied, and the paddles gradually lowered whilst revolving at the rate of about sixteen revolutions per minute, so that in half an hour the slimes were washed into a pulp again; after further dilution, settling and decantation would proceed, and the pulp be sucked dry by the vacuum pump a second time. This gave a smaller volume of solution to deal with, and less gold in the slimes after each settling. The wear and tear, however, on the surface of the filter (which necessarily had to be composed of fine fabric in the shape of a double thickness of cotton twill, supported on a cocoanut matting) was excessive. The cost of keeping the suction pumps in order, and the power and attention they require, made this method fairly expensive; the extractions obtained, however, were satisfactory. Such a process for rich material running 15 dwts. or more to the ton is well adapted to give a high extraction, and when dealing with such high-grade material the cost would not be relatively high.

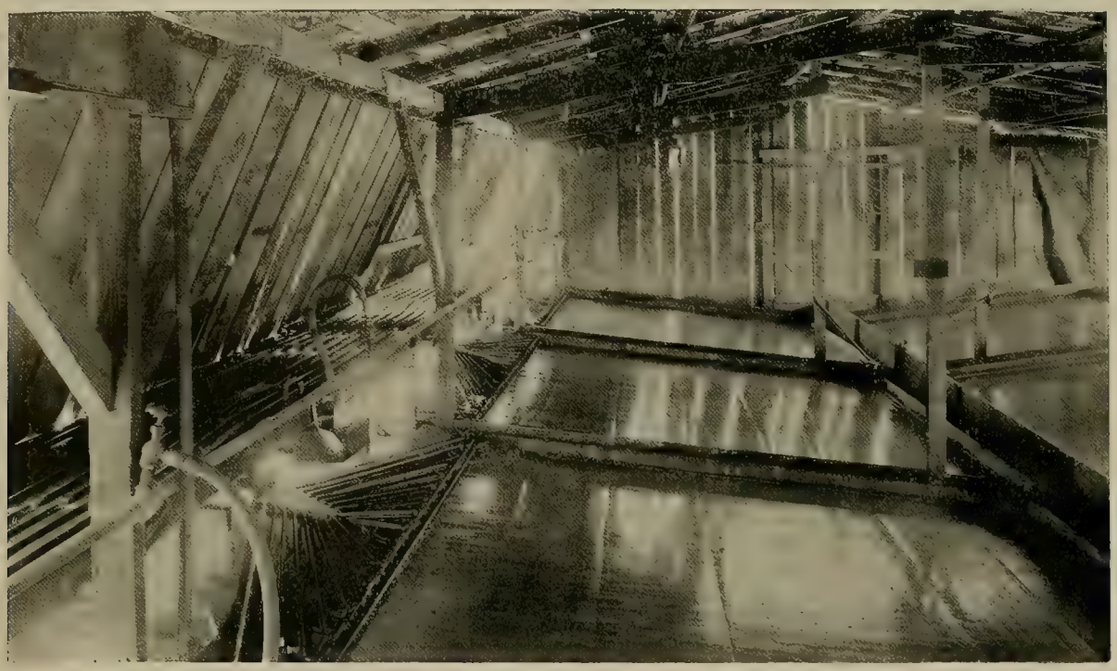
The process adopted by Mr. J. R. Williams at the Crown Reef, known as "natural settlement," and afterwards adopted at our Robinson works, is now the method generally used; in other words, the combined process of decantation and leaching by means of vacuum pumps has been found too expensive for the treatment of the low grade slimes produced on these fields—hence we have been obliged to adopt the principle of natural settlement. Decantation, as ordinarily practiced in large, shallow vats, means that at least a ton of solution is thrown away with every ton of slimes. To reduce this large amount of solution thrown away we have erected at the Central Works of the Rand Central Ore Reduction Company the two largest vats in the world, each being 50 feet in diameter and 16 feet deep, with a capacity of nearly 1000 tons. These tanks, being discharged only once a week, accumulate in the interim 9 feet, 10 feet or 11 feet of settled slimes, equivalent to from 450 to 600 tons of dry slimes. It has been found that, by filling them gradually and allowing them to settle for about a week, the pressure exerted by the great depth of settled slimes has the effect of reducing the average moisture to about 40 per cent, which means less solution thrown away. Moistures as low as 34 per cent and 38 per cent have been obtained, and I think that in the future very large and very deep tanks will be utilized for the natural settlement of slimes. The settling capacity of these large vats has of late been considerably increased by the use—suggested by Mr. W. R. Dowling—of a "sub-level delivery" of the diluted pulp introduced into them. In place of allowing the stream of pulp from the launder to fall upon the surface of the liquid in the vat, thereby causing considerable disturbance and involving alternate filling, settling and decanting, the pulp is now carried half way to the bottom of the vat by means of a section of large-diameter pipe, open at both ends, and suspended above the center of the vat. As a result, the slimes, having less distance to settle, do so more rapidly; and, the surface of the liquid being unruffled, clear solution is always available for decantation or overflow at the top, so that its removal can proceed simultaneously with the pumping into the vat of diluted pulp. In the removal of the settled slimes from these vats the method of "hydraulicking" has been adopted. That portion, resembling puddled clay, of the settled mass of slimes which is too thick to flow is washed out through a door in the bottom of the vat by means of a jet of water delivered from a pressure pump through a hose and ¾-inch nozzle at a couple of hundred pounds pressure per square inch. This rapidly disintegrates and carries away the sticky mass, and in this manner 500 tons weight of slimes can be discharged in three hours with very little labor or cost.

The concentration of the solution, as regards its gold contents when decanted, was first successfully introduced by Mr. J. R. Williams at the Crown Reef plant, in order to reduce the amount of solution passing through the precipitating boxes. Naturally, when a given amount of gold in solution is obtained from the slimes per twenty-four hours, if you can concentrate this amount of gold into a small volume of solution, a small precipitating capacity is required. For these reasons Mr. Williams introduced the system of double washing—that is to say, the first solution that is applied to the slimes after decantation is not clarified and passed through the precipitation boxes, but is run into what is called an "intermediate tank" and then pumped up for use again upon a fresh charge of slimes. After this second decantation it is run through the clarifying apparatus to the boxes for precipitation. The settled slimes are then re-pulped with an equal volume of solution from the precipitated sump—that is, solution which has passed through the precipitation boxes. Theoretically, one could carry on the enrichment of the unprecipitated solution until it was equal to the value of the slimes, but in practice it has been found that the first wash which has not been precipitated and the second wash which has been precipitated (two washes altogether) make the simplest and most perfect system. This idea was carried out on tailings at the first cyanide works I constructed in this country—namely, the Robinson cyanide works. I attempted to enrich the solution by passing the liquor from the leaching vat through another charge before allowing it to enter the precipitation boxes, but this practice was not found economical. Cyanide solutions leached from tailings are sufficiently rich to pay for immediate precipitation. As I have already stated, their value may be 6 dwts. or more per ton. Taking po or slimes assaying 2½ dwts., from which possibly 2¼ dwts. may be dissolved by eight volumes of liquor, the resulting solution would carry about 7 grs. per ton if it contained absolutely no gold when added; with practically perfect precipitation its value would be about 8 grains. By applying this a second time before precipitation a value of about 15 grains per ton could be obtained, while with slimes running from 5 dwts. to 6 dwts., concentration takes place up to about 1¼ dwts. or 1½ dwts. Another point in favor of concentration of the solution is that the less solution you introduce into the precipitation boxes the less mechanically suspended slimes you carry into the box, and the less lime salts are deposited therein; hence the better is the precipitation and the less the gold in the by-products. Double washing means practically double the time of treatment that a single wash would occupy, which in turn means, for a given tonnage of slimes, double the number or double the size of the vats. And while theoretically it appears that we could concentrate the solution up to the value of the slime itself, practical considerations of the number of vats required and the number of operations to be carried on, the amount of pumping, and the care needed to watch the various kinds of solutions, bring the economical point down to that of a double wash. I am inclined to think that this system of double washing, as now adopted, will remain a feature of the slime process.

(*To be Continued.*)

California Methods in Colorado.

In the issue of the 12th ult. was an illustrated notice of the Smuggler-Union mine, near Telluride, Colorado. Connected therewith is an enterprise which, having demonstrated its worth at the Kennedy mine, Amador Co., Cal., is now financially successful in Colorado. Early in '97 Kirby & Gates of this State built a canvas plant near the Smuggler-Union mill to treat the tailings.



THE GATES CANVAS PLANT AT THE KENNEDY MINE, AMADOR COUNTY, CAL.

The apparatus is operated on the assumption that the coarser portion of the pulp from the mill contains its value enclosed in grains of quartz in such a way that it cannot be recovered on his plant without further crushing. Primarily, he separates the coarse sand and saves the fine sulphurets, as noticed herein by W. S. Hutchinson. This separation of the coarse from the fine is effected in two "segregators," each constructed as shown in the sketch (Fig. 1). The pulp from the mill enters the distributing boxes, which have a bottom of sheet iron with ⅛-inch holes. These deliver the pulp in a shower to the separating box of the segregator. In this box the coarse sand settles, while the fine material is kept up by a rising stream of clear water, which is delivered at the bottom of the pipe just above the spigot. Sand and water escape steadily from this spigot, which is a ⅜-inch bushing of iron pipe in a rubber cork. The fine pulp overflows in a sheet over the end of the machine and enters a divided trough with twelve compartments, through which the pulp is distributed to the canvas tables. The plant has twenty-four working tables arranged in two rows of twelve, facing each other, and sloping together to the tails launders. In addition, two extra tables receive the pulp when it is turned off from a pair of the working tables for hosing off. The canvas of each table is 12 feet wide, 10 feet long, stretched upon a floor sloping 1½ inches to the foot. The arrangement of distributing troughs and tables is shown in the sketch plan and cross-section (Fig. 2). The device for receiving the tailings and concentrates at the foot of the tables is shown in Fig. 3. While pulp is running over the table the tilting tail (*T*) is turned so as to deliver into the tails launder (*L*). After washing, the tail is turned, as shown, to the right, and the concentrates are hosed into the launder (*C*), which is divided by a splashboard (*S*).

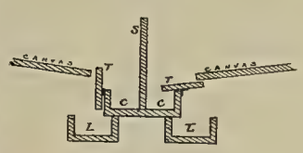


Figure 3.
SCALE 1 inch = 1 foot.

When the pulp has run on a pair of tables for an hour it is turned off and run to the extras. Clear water is turned on for a few minutes to partially clean the sulphurets caught on the canvas. The tilting tail is then turned so as to deliver into the heads launder, and the table swept off with a hose which throws a broom-shaped stream. These concentrates run to a settling box 2 feet by 12 feet by 2 feet deep. The overflow from this box goes to a canvas table and then to the tables which receive also the tails from the vanner mentioned below. The material settled in the tank has a value of about $30 per ton in gold and must be cleaned. It is, therefore, shoveled to a trough, whence it is washed by a small stream of water to a short, smooth belt and end-shake machine run with a very rapid shake, steep slope and thick pulp. Travel—1 foot in 11 seconds. Throw—$\frac{7}{16}$ inch. Shake—240 to 260 per minute. Slope—$1\frac{1}{16}$ inches per foot.

The tails go to the table which in turn discharges to two others in succession. The material caught upon these tables amounts to from two to three tons per month and has an assay value of about $60 per ton.

The flow of the pulp over the tables takes the form of a succession of waves. At the head of the table these waves have a length of five inches from crest to crest and at the foot of the table 12 inches. This does not indicate a corresponding acceleration in the velocity of flow at the foot of the table, but is caused by the retarding of one wave by the sand in front of it until the succeeding wave overtakes it, when they go on together. These waves travel from the top to the bottom of the table (a distance of 10 feet) in from six and a half to eight seconds, as measured with a stop watch, and the depth of the pulp, measured with a micrometer gauge, was:

	1 Foot from Head.	*1 Foot from Tail.*
Crest of waves...	.063 to .068 in.	.068 to .075 in.
Trough of Waves	.050 in.	.040 to .045 in.

The Smuggler-Union mill crushes about 200 tons of quartz per day, and from the Gates & Kirly plant are shipped six carloads of concentrates per month, averaging $70 per ton. When working at the Kennedy in this State, the fine sulphurets collected on the canvas plant were found to assay $10 to $15 higher than the mill concentrates. The mill tails gave an average assay value of $1 in gold. In passing through the segregator seventy tons of coarse sand were thrown away and twenty tons of fine slimes delivered to the tables.

The estimated amount of water used was:

	Miners' Inches.
Received with the pulp from the mill.....	1
Clear water used in the segregator.....	8
Clear water used in cleaning and hosing off.	1
Total	16

This was verified by measurements made by timing floats with a stop watch in the tails launder.

No. 6 canvas is used, which is renewed every eight months. During that time it is shifted every month, to bring the cracks of the floor in different places. Hot weather affects the canvas badly. The cost of the Kennedy plant was $2000.

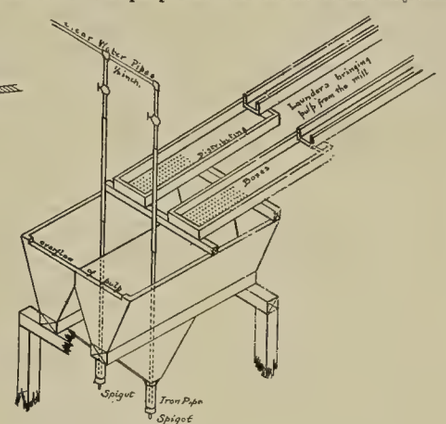
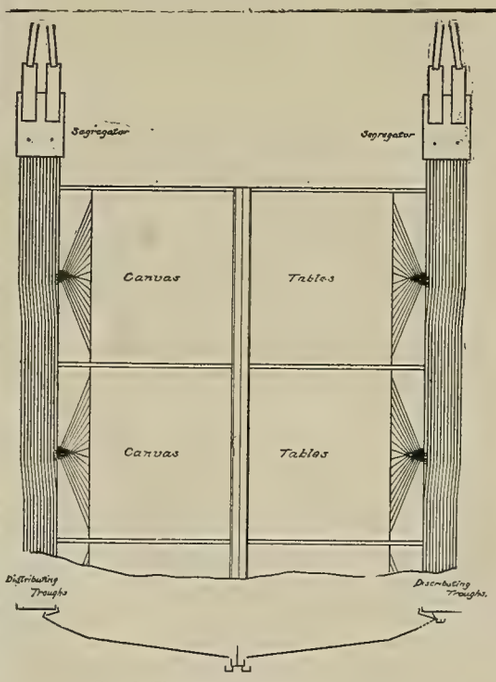


Figure 1. — Segregator.
SCALE ½ inch = 1 foot



Sketch Plan and Cross Section. Figure 2.
SCALE ¾ inch = 1 foot

SECTIONAL VIEWS OF GATES CANVAS PLANT.

FROM James Baker, British Columbia Minister of Mines, is received his annual report for the year 1897, of unusual interest and value, accompanied by maps and illustrations and conservatively compiled. From the elaborate tables it appears that the placer gold yield of the province for the year was $513,512. This placer gold contained from 10% to 25% silver. The quartz gold yield for the same time was $2,122,820, both increases over the net results of '96. Recommendation is made to require a certain amount of discovery work to be done within ninety days after date of location. There is a detailed description of the principal hydraulic mines, mainly in Quesnelle district, which are operated by successful California hydraulic miners on the same general principles, modified by location. Some of the best California inventions and practices are in satisfactory operation therein. There is considerable valuable descriptive matter, and several special articles of present interest. In the report is embodied an up-to-date list of crown grants issued for mineral lands for 1897, with the name, claim, district, name of the grantee, area, description and date. A report by Inspector Dick of the coal mines of the province completes the book of 640 pages, which is throughout commendably arranged and of more than ordinary value.

A PROCESS for utilizing the waste residue of petroleum by solidifying it for use as a fuel has been invented by a German chemist. The *Revue Scientifique* reports a recipe for the preparation: Heat, without contact with the air, or in superheated steam, ten parts of soda, ten parts of fatty matter, as palm oil, and eighty parts of petroleum. Boil for an hour at a temperature below the boiling point of petroleum. Large quantities of volatile oil are thus fixed by saponification, and when cool the mass is solid. There may also be mixed with it charcoal powder or dust. If less solid products are required, the grease is replaced by resin or resinous acids. Thus are obtained products containing more than 90 per cent of combustible and less than 5 per cent of fixed residue.

THE present assessment on the Bullion, Nevada, mine is No. 52. This is a Storey Co. property, worked continuously for over twenty-five years, which has never paid a dividend nor even running expenses. It is interesting to note under private management what fraction of twenty-five years such an untoward condition of affairs could exist. The matter is a monument to the possibilities of the assessment system.

THE dividend paid by the Calumet & Hecla Copper Company of Michigan on the 1st inst. aggregated an even $1,000,000. It is only a mining company that can declare such dividends.

Gold Deposits, Geology and Geography of Alaska.

NUMBER IV—CONCLUDED.

The richest gravels have been found in the Birch Creek and Forty-Mile districts. In the entire Birch Creek district, which lies south of Circle City, and on Miller, Glacier, Poker, and Davis creeks of the Forty-Mile district, near the international boundary, the bedrocks are always the quartzite-schists of the Birch Creek series, containing veins of quartz. The gravels rest, as a rule, directly on the schist, though in some cases, as on Harrison and Eagle creeks in the Birch Creek district, there is clay beneath the gravels, and the gold as a rule does not extend into the bedrock, but occurs chiefly at the top of the clay. Generally, however, the schist is rotted and reddened from oxidation for a few inches to several feet below the surface, and in this part the gold has settled into the cracks and joints. The clay gravels lie mostly next the bedrock, in an average thickness of perhaps 2 feet, though sometimes up to 10 feet, while the overlying gravels average 8 or 10 feet, with a maximum of 25 feet. In the gravels the schist is in quite large, flat fragments, and the quartz is in bowlders of varying size. The schist fragments lie flat, and are mixed with sand, showing that the sorting action of running water has not been carried far. In the concentrates from the sluice boxes the heavier minerals associated with the gold—galena, magnetite, limonite, hornblende, and garnet—are in each case such as are found in the neighboring schists, and the nuggets of gold often have pieces of quartz still adhering to them. All these facts are evidence that the gold is derived from rocks in the vicinity, and is not brought from a great distance, perhaps by glaciers, as some erroneously suppose.

The rocks of the Forty-Mile series in the Forty-Mile district, as already stated, form the west bank of Forty-Mile creek, and south of the South Fork cross the divide between Franklin gulch and Napoleon creek, where they are overlain by green slates of the Rampart series, which in turn are overlain by conglomerates of the Mission Creek series. In Franklin creek the bedrocks are marbles interbedded with mica and hornblende - schists; the gravel contains fragments of marble, quartzite, mica-schists, and vein quartz. At one point a quartz vein is found in the bedrock, and below it native silver has been found in the gravels, which apparently came from this vein. It is the schistose rocks that mostly carry the gold, as the marbles do not show much evidence of veins. In this gulch are two levels; the higher one, at the head of the gulch, had not been worked, while the pay gold had been found mainly at the lower level, near the mouth of the gulch.

Chicken creek, so called because its gold occurs in grains the size of chicken feed, drains a wide area toward the Ketchumstock hills to the southwest, and the actual source of the gold is less readily defined. The gravel contains fragments of granite, quartzite, schist, and marble.

On Napoleon creek conglomerate forms the bedrock near the mouth. The gravels contain fragments of quartzite, vein quartz, hornblende-granite, and various eruptive rocks, and the source of the gold is assumed to be the conglomerate, which is made up of fragments of the older rocks, for the rocks higher up the gulch above the conglomerates have not been found to carry much gold.

The most trustworthy reports from the Klondike region indicate that the exceptionally rich placer gravels thus far found occur in side valleys entering the main Klondike valley from the south, such as Bonanza, Eldorado and Hunker creeks, and in some gulches across the divide tributary to Indian or Stewart rivers. No gold in paying quantities has been found on the Klondike itself. The placer deposit generally consists of 10 to 15 feet of frozen muck and decayed vegetation at the surface, then a gravel bed that rarely pays; below that a clay selvage, under which is pay dirt from 1 to 5 feet in thickness resting on the upturned edges of the schist, from which it is separated by a clay selvage. The pay streak or bottom of the old channel is usually very regular and straight, not following the bends of the present stream. It is said to average 60 cents to the pan, and may yield $1 to $3. Only very exceptionally rich gravel can be worked at all under present conditions.

Probable Extent of Gold-Bearing Deposits.—In a new country gold is first sought in the stream gravels, and thence traced up to its source. Very fine gold may be carried long distances by river waters; hence it is only when it becomes relatively coarse, or at any rate carries coarse particles, that the source may be considered necessarily near at hand. Fine gold is found in almost all the rivers of Alaska; even the silts of the Yukon yield it in places. Gold has been found along the whole length of the Lewes, the Teslin, the Big Salmon, the Pelly, the Stewart, and the Selwyn, and on the Yukon river almost continuously from the junction of the Lewes and Pelly downward. Still further east, Frances and Dease rivers, the main branches of Liard river, which flows into the Mackenzie, carry gold. In the Cassiar district, on the Dease river, gold was discovered as early as 1861. The district was actively worked as a placer camp from 1873 to 1877, during which time it yielded about $5,000,000 worth of gold dust. These upper regions are distant about 1000 miles in a straight line from the known outcrops of gold-bearing rock in the Rampart mountains on the lower Yukon, are within areas either in which the exposures of the gold-bearing rocks as defined above are actually known to exist or in which the similar lithological character of rocks described renders it probable that in some part of the area they may be exposed.

There is also some evidence of the extension of rocks of the gold-bearing series to the northwest of the Lower Yukon, though it is as yet impossible to determine whether the primitive gold-bearing rocks of the Birch Creek and Forty-Mile series there come to the surface, or whether it is simply the fossil placers or gold-bearing conglomerates of later formations, where made up of fragments of these older rocks, that have furnished the gold of modern streams.

In this region gold has been found exclusively along the Koyukuk, and most abundantly, as already mentioned, where the valley cuts through conglomerates, supposed to belong to the Kenai series. This is at the forks, about 300 miles above the mouth, below which the country is low and swampy. Above the forks the mountains close in and the sides of the valleys become precipitous. The gold in the bars is said to be coarse, suggesting nearness to the source, and has yielded as much as $100 per day by use of the rocker. Prospectors are said to have explored to considerable distances above the forks, up to 500 miles from the mouth, and to have recognized rocks similar to those of the Birch Creek and Forty-Mile districts. This, if true, is important as an indication of still further extensions of the area of exposures of the older gold-bearing rocks.

Farther east, at the head of Dall river, low, broken hills, apparently composed of schists and quartzose rocks, extend northeastward to the Romanzof mountains. The latter are snow-covered in summer, and form the northern boundary of a low plain that lies to the north of Porcupine river. These mountains are likewise said to be made up of metamorphic schists and quartzites.

Still farther northwest, in the country to the northeast of Kotzebue sound, gold has been reported from the Kowak and Noatak rivers. It is possible that the older series of rocks is exposed in the mountains of this region, but more probable that the gold is derived from the conglomerates of the Mission Creek series, which, as already shown, afford gold on Napoleon creek and in the Mission Creek district.

Gold is also reported by prospectors from a belt of country which is generally parallel to the known gold belt but set off to the southwest, and which corresponds to the supposed southwestern flank of the granite backbone. Such discoveries have been reported from Fish creek, which flows into Norton sound north of St. Michael, and from the upper Kuskowim river, which flows into Bering sea. On the Sushitna river, which flows into Cook inlet. W. A. Dickey reports colors of fine gold in the sands all along the stream, and platinum on the upper river, where veins of white quartz carrying gold, silver and copper were found in slates associated with granite and porphyry. Gold and copper have been reported by various persons from the region about the sources of the Copper and White rivers. It is thus evident that the elevated region along the heads of these various streams, and between them and the waters of the Tanana, possesses great possibilities in the way of mineral development, but from all accounts it is a region exceptionally difficult of access, and it may well be questioned whether it is advisable to attempt its exploration until facilities for travel and obtaining supplies in the Yukon region have been increased, as they undoubtedly will be in the near future.

More accessible is the region immediately north of the Tanana river known as the Tanana hills and Ketchumstock hills, which from recent reports appears to be mainly a granite region, but in which it is likely that the outlines or patches of the gold-bearing schists will be found inclosed within the granite area.

Late reports by prospectors in the Tanana region state that the river has slack water, navigable for steamers 150 to 200 miles above its mouth; above that the current is swift. Mountains border the river on the north side from the mouth up; on the south they are far distant. Colors are found in all the creeks; those heading toward Forty-Mile and Seventy-Mile offer best promises, but no important prospects have been found. Toward Circle City the creeks do not freeze up, and a hot spring was found in one of the gulches.

In the mountain region to the northeast of the Yukon river, immediately above the bend, such observations as have been made do not offer much promise of exposures of the older gold-bearing schists. Older limestones occur there, but though important gold deposits are known to occur in limestones, in the Yukon country the general rule appears to prevail that gold is concentrated mainly in the siliceous rocks. It may well be, however, that in the conglomerate or cement deposits of the coal-bearing formations that are known to occur in this northeastern region there are portions sufficiently rich in gold to make payable placers by their wearing down. In searching for such places the prospector should study the character of the pebbles that make up the conglomerate. It is only when these include fragments of the gold-bearing rocks, and occasionally of vein quartz, that they are likely to be productive.

For the region east of the international boundary, Sparr had already pointed out, as a result of his observations in the summer of 1896, that the Klondike and Indian Creek regions were likely to show rich placers, because the schists of the Birch Creek series, and to some extent the marbles of the Forty-Mile series, formed the bedrock.

George M. Dawson reports bars of fairly coarse gold on the Pelly all the way up to Hoole river. Just below the mouth of the McMillan the river has cut a canyon through gray granite hills, below which are dark crystalline schists with east-west strike and northerly dip, associated with which are alternating marbles and chloritic schists, probably of the Forty-Mile series. Granite occurs again near the junction with the Lewes. Of the valley of the McMillan nothing was known. The Pelly above the detour or bend had a similar series of quartzite-schists, with interbedded limestones on the north, while the Glenlyon hills to the south were of granites. Above these are sandstones supposed to belong to the coal-bearing series and dipping 45° S. Still higher up in Hoole canyon are marbles again, associated with schists and volcanic rocks, possibly of the Rampart series. Still farther northeast, in the middle canyon of the Frances river, Dawson found marbles again, while in the Tootsha range to the east were seen granites and schists with abundant quartz veins.

All along the summit of the Coast Range the prevailing rocks are granites, cut by later prophyry dikes. They form a belt 20 to 80 miles wide, and are generally of the hornblende or intrusive type. On the Dyea and Skaguay trails they extend down on the northeast side to the mid-lenght of Lake Bennett. In the range of hills between Miles canyon and the Teslin river are diabasic or dark eruptive rocks and limestones, which may belong to the Rampart series, though Dawson considers the limestones to be probably Carboniferous.

Along the region of Rink and Five Finger rapids, below the Big Salmon, are infolded masses of Cretaceous rocks (Kenai?) with conglomerate at the base, overlain in places by lavas. Below these are greenish eruptive rocks, and near the mouth of the Pelly is granite again, succeeded below the Pelly by basalt flows. Twenty-five miles below the Pelly granitic rocks again appear, and are succeeded by crystalline schists of various kinds, which constitute the prevailing rock down nearly to Forty-Mile.

Drilling on the Mesabi Range.*

By E. J. LONGYEAR.

There are several kinds of drills in use. The diamond drill is largely used, and possesses the advantage of being in readiness to drill rock if thought advisable, the taconyte being very hard and almost impossible to drill, except by the use of diamonds. Some form of churn drill has been much used. This may be either a steam or a horse-power drill. The principle is the same in each, the cutting being done by percussion instead of by rotation, as in the case of the diamond drill. A churning motion is given by passing a rope from the top of the drill rods up through a sheave wheel, and down again, running two or three times around the drum of the engine, leaving the end loose. The drum continually rotates, and a man at the loose end alternately tightens and slackens the rope, thus raising and dropping the drill-bit at will. The bit itself usually has a single cutting edge, rather thin toward the lower end, and a thread cut on the upper end, in order to attach it to the drilling rods, which may be the flush-joint rods used with the diamond drill or extra strong gas pipe connected by extra long couplings, to protect the threads from the strains occasioned by the pounding of the bit. In surface drilling a 3-inch casing of common gas pipe and a 1¼-inch drill rod are used. In ore a 2-inch casing is put in after the 3-inch has been stopped, and a 1-inch drill rod is used. A 4½-inch casing pipe has been tried several times for deep surface work, and after it could be driven no farther a 3-inch pipe was inserted; but it was found that the sand is quite liable to rise between the two pipes and hold them together, preventing the smaller pipe from being driven. As a rule, it is safer to start from the top with a 3-inch pipe, and make every effort to carry it through the surface.

Surface drilling requires more experience on the part of the drill man than ore drilling, which is simpler in operation, although requiring great care in order to secure reliable results. In surface drilling many difficulties arise calling for much ingenuity. A bit may be lost off and be wedged across the hole in such a position that it cannot be recovered, when

* Lake Superior meeting American Institute Mining Engineers.

perhaps a stick of dynamite will force it to one side, out of the way. Sand may arise between the drill rods and casing pipe at a time when the pump refuses to work, holding the two together so tightly that jackscrews will not loosen them. A number of methods will probably have to be tried before the rods can be recovered. A boulder of any size is best overcome by shattering it with 60 per cent dynamite, care being taken to raise the casing pipe at least 5 feet after lowering the dynamite to the top of the boulder. An electric battery is used to do the blasting. Two or three blasts will allow the casing to pass through almost any boulder, unless it is an unusually large one. Careful blasting and attention to keeping the pipe loose by turning it while driving are important points to be observed.

The cuttings are washed out by means of water forced down by a pump through the hollow rods, and up again between the rods and casing. The operations of drilling, washing out, and driving the casing are carried on sometimes singly, sometimes two at once, and sometimes all three together, according to the nature of the ground. A No. 4 pump is a good size to wash with. It can be easily lowered into a small test pit, and it will handle enough water in most cases. A cast iron cylinder 10 inches in diameter and 12 inches long, with a 2-inch hole through the middle, weighing 240 pounds, makes a good drive block. The hole is for the rod to pass through and acts as a guide for the block, which is raised by attaching the drill rope to it, and operating it the same as in raising and dropping the drill rods.

After striking ore, if the material just above it is sandy, it is better to drive the 3-inch pipe 5 feet into the ore and stop, continuing in ore with a 2-inch pipe, as fine sand is apt to run down behind the casing and injure the ore sample if the same pipe is used in sand and ore. The Mesabi ores are too soft to make a core with a diamond drill, and are generally sampled by the churn drill, the cutting made by the bit being washed out through a tee in the top of the casing. Even when a diamond drill is used, it is better to run it as a churn drill, although the more rapid progress made with a diamond bit offers a temptation to use it. But the revolving rods, grinding on the casing pipe, wear off a large amount of metallic iron, which mixes with the ore sample, producing at times surprising results in the assays. The cuttings made by the chopping bit are often washed out at the same time that the drill is working; but more accurate results can be obtained by drilling "dry"—that is, by chopping without pumping any water through the rods, the cuttings mixing with the water that stands in the hole. When the depth desired to be sampled has been drilled, the casing pipe driven down, and the material that has been packed by driving loosened by redrilling, the chopping is stopped, and water is turned on, flushing the sample to the top into barrels. The pump should be worked to its fullest capacity in order to bring up the complete sample with a minimum amount of water. One barrel of water will usually be sufficient to wash out a 5-foot sample, unless the hole is more than 200 feet deep. After settling until the water is clear, it is drained off, and the sample is taken out, dried, quartered down, if desired, sacked and properly marked. When the ore is drilled "wet," the water carrying the sample is run through a series of three or four settling barrels, the overflow from one passing into another. When a sample has been drilled, the clear water is drained off, and the sediment in the different barrels is collected together and dried.

The dry method of drilling is preferable to the wet for two reasons. First, it drills a hole of uniform size—a very desirable feature in accurate sampling—whereas in the "wet" method a stream of water is continually playing around the bit, and will wash out more of the soft layers than the hard. The Mesabi ores usually occur in alternate layers of hard and soft ore. Second, the water overflowing the barrels is liable to carry away more or less of the lighter parts of the sample, making it too rich in iron.

The writer made some tests to determine the effect of incomplete settling on the sample, and also the effect of heat in drying. A sample was made up by mixing a lot of blue ore, brown ore, yellow ore and paint. After crushing to about the fineness of a drill sample, it was carefully mixed and divided into five portions. These were treated as follows:

Portion A was analyzed for iron and phosphorus; B was mixed in a pail of water, allowed to settle sixteen hours, water poured off, and sediment dried at less than 212° F.; C was mixed in a pail of water, allowed to settle sixteen hours, water poured off, and sediment dried at a high temperature; D was mixed in a pail of water, settled sixteen hours, sediment dried with considerable heat until nearly dry, and then finished slowly; E was mixed in a pail of water, settled twenty minutes, water drained off, and sediment dried at less than 212° F.

The analyses of these dried ores resulted as follows:

	A	B	C	D	E
Iron, per cent.....	59.23	59.69	59.95	59.67	60.804
Phosphorus, per cent..	0.087	0.086	0.087	0.880	0.09

The conclusions to be drawn from this test are that too much pains cannot be taken in allowing a thorough settling of the ore sample before removing from the barrels, and that a rapid drying will not injure the sample materially. I have, however, made a practice of using considerable care in drying.

The taconyte underneath the ore is hard to drill, but with the aid of dynamite enough can be secured to determine its character.

The drilling on the range is mostly done by contract, $2 to $2.50 per foot being paid for ore, $2.50 to $3 per foot for surface, and $4 to $5 per foot for taconyte. Three men to each crew work to the best advantage. Wages are from $1.35 to $2.25 per day. A good outfit costs about $800.

An accurate map of the work should be made, drawn to a scale of 200 feet to the inch, and the ore area marked on it by a line inclosing all the ore pits. It is the practice to allow 100 feet outside the ore pits in locating the boundary line. The ore area, being measured on the map by means of a planimeter, is reduced to square feet, and multiplied by the average thickness of ore as determined by the different pits, giving the contents in cubic feet probably as nearly accurate as the prismoidal formula would give it. To reduce this to tons, 13 cubic feet is usually taken as equal to one ton.

Points for Prospectors.

Philip Minor of Seattle, Wash., has written a little book which embodies a good many practical pointers for miners and prospectors. It is intended mostly for the amateur, though some of the contents of the pamphlet could be read with profit by experienced men. This is his idea as to "Where to Prospect":

In exploring a new country not previously prospected, the all-important question to be determined first is: Is the object you are seeking in the region you are in? The first route of exploration, and often the main line of travel, is along the river; either on the water or along the bank. If game is your object, look for tracks at the places of easiest access. If you are seeking gold, the easiest place to find the trace is among the boulders at the water's edge at low water, and at the head of the rapids.

Find a place on the low bars, where the current is strong enough to carry away all the light gravel when the water is up, but not strong enough to tear out the boulders as large as your head. If you find a few points of rough bedrock sticking up, it is the best in sight. Now, with a pick or bar, turn out a few boulders and take the sand and gravel from among them and pan it carefully. If you get a large handful of black sand, and not a color of gold, try two more such bars, and, if they yield the same, go down stream, for there is but a very slim chance of any pay on any branch above.

If you get some gold, but not rich enough to satisfy you, then hunt for some place where you can dig to bedrock, and find a layer of coarse gravel on what is or has been at some time the head of a rapid. Dig there and test the gravel, and also clean out the crevices in the bedrock and wash the dirt. If the pay dirt is not there, it is probably up the stream; perhaps up some creek or gulch, each of which you should try as you pass.

When you have found a creek that prospects better, or yields coarser gold than the river does above the mouth of it, follow it up. Take notice as to what kind of rock the gravel is made up of and the nature of the bedrock, and when you pass a rapid or find the channel widening out, so as to form a bar on either side of the stream, try for bedrock, the same as on a river, at both ends of the bar, and don't forget the small gulches.

The best claims on a river or large creek are most likely to be where the channel is of moderate width, and the bedrock has a natural grade of 7 to 18 inches to the rod. Deep holes in a channel very rarely pay for cleaning out, theorists and professors to the contrary notwithstanding.

The best claims on a small gulch are at, and just below, the ledges and veins that furnished the gold, due allowance being made for water.

Diggings are often found on the sides and tops of hills, and, if the water can be obtained for working, they sometimes pay wonderfully. They are of two sorts. That is, old channels and vein outcrops.

The old channels are where the streams have run in an earlier age of the earth, and, while usually following the same general course as the streams of the present age, they often cross nearly at right angles, and in rare cases even run the other way. They may be good, poor or indifferent, but usually have the advantage over the modern channels of having plenty of dump. Their most common form, that of high bars near present streams, are often the best paying mines in their districts.

In some parts of the world they are covered with lava or other volcanic flow, in such a way as to puzzle the oldest inhabitant; and it takes a fine flow of speech, indeed, to describe them so that sensible people will think the speaker understands them.

Vein outcrops are usually richer and more profitable than the veins that they lead up to, but not always. Very much depends upon the character of the rock, and the gold is often hard to save, being in all shapes and sizes, and often coated with other mineral, or enclosed in rock, which makes crushing necessary.

Nearly every miner is more or less tied to his own theory as to where gold is likely to be found, which is the result of his own observation and study, and, when he finds out, and is compelled to acknowledge to himself that his own pet theory is wrong, he usually contents himself with the proverb of the ancients that "Gold is where you find it," yet it remains a fact that you are more likely to find it among some kinds of rock than among others, and it may be set down as a rule that, when all the rocks you can find in a certain region lie in horizontal layers, whether they are of slate, limestone, sandstone or lava, and the boulders in the streams consists of the same material, it is not worth while to look for gold in that region.

If the hills are rounded at the top like haycocks, and boulders of porphyry and pieces of quartz are common in the streams, the stratified rocks dip under the hill, and dykes of porphyry and other eruptive rocks are common, then gold is likely to be found not far away.

And the largest and best mines are usually found near where the longest and strongest dykes or eruptive rocks cross that part of the country rock which carries the gold. And sometimes it is the eruptive itself which furnishes all the gold, though its stepmother, the quartz, gets all the honor.

Among old-time miners it is said that "quartz is the mother of gold," and, as a matter of fact, when both are found in the same kind of country rock, on one hill, they are nearly always both in the same fissure, or vein; though either one may be found with scarcely a trace of the other. Veins containing gold, however, nearly always contain either quartz, iron or talc also, and often all of them, and many other metals, making a rock that almost anyone would recognize as ore, and, with a little practice, could readily trace it home, if not too much scattered.

Among placer miners black sand is said to be an indication of gold. As a matter of fact, when both gold and black sand are in the bed of the same stream, where the currents throw one they will throw the other also, as both are much heavier than common sand. So, in prospecting a stream, if you get one in large quantities and none of the other, you can take it for granted the other is not there.

From Arizona.

TO THE EDITOR:—A recent trip to several sections of Arizona has impressed me with the general spirit of enterprise and activity prevalent there. The copper mines at Jerome, Bisbee, Globe and Morenci have never produced so largely as now, and all are preparing to increase their output. In various sections copper properties with promising indications are being developed, and others are beginning to attract the attention of capital. The railroad now terminating at Geronimo, Graham county, is being rapidly extended towards Globe, and this substantial copper camp is shortly to have the transportation facilities she has so long needed. I saw Apaches at work upon the railroad and at other avocations suggestive of peace and comfort, and at San Carlos Agency found the Indians actually contemplating with complacency the coming of the railroad. A strip of the Reserve, upon the south, has lately been surveyed, and is soon to be segregated from the Reservation. This strip includes the Deer Creek coal fields and a large section showing promising indications of copper. The strip is well peopled with men holding possession of coal and mineral locations, and who are awaiting the opening of the strip to perfect their titles. Very little work has been done in the way of development upon any of the claims, but I saw a number of locations showing good carbonate, oxide and sulphide ores and native copper, and some of the ores are said to contain more than a paying amount of gold and silver. There is much iron present, and the country is a good formation of quartzite, lime, shale, sandstone, etc., cut with porphyry dikes. This strip may yet be heard from as a copper producer, and if the Deer Creek coal fields produce coal in quantity, and of a fair coking quality, the section might have many advantages as a mining region.

Several projected branch line railroads are about to be constructed, and it seems to be generally considered that the next few years the completion of the very large water-storage and irrigation enterprises for the development of the rich and extensive agricultural lands of the Territory.

Arizona has much reason to be content with her present share of prosperity and real reason to be certain of the early future development of her latent possibilities. JNO. W. GRAY.

Oakland, Cal., April 2nd, '98.

THE great demand for copper is rendered still greater by the present hostile complications. The United States and Spain are the greatest copper producers, and war possibilities make copper properties to-day more valuable than ever. There is probably no business of more present profit than copper mining. Every department of mining, the basic industry of peace or war, receives increased stimulus from the present warlike outlook.

Paraffine Paint.

TO THE EDITOR:—In the issue of your paper under date of March 26th, you have an article headed "Some of the Questions Asked." One of the subdivisions of this article is a reply to a question from a Rossland, B. C., correspondent who wants to know "how to keep timber for underground use from decay." In reply to this you give as your opinion that the creosote process is probably the best treatment to which this timber could be subjected.

We are writing you for the purpose of calling your attention to P. & B. paint, which has been manufactured by us and been on the market since 1884. This paint is used to a very considerable extent for the purpose of painting timbers which are submerged in water or in the earth, and is an excellent material to use for the prevention of decay and rot and for the preservation of the timber.

Our paint differs from the ordinary asphaltum paints and the many products of coal tar, and must not be confounded with these articles, which give merely a surface coating. P. & B. paint, on the contrary, effects a complete bond with the wood or iron to which it is applied, has great tenacity and is a wonderful resistant to acid and earth gases. For this reason it is largely used for timber preservation.

PARAFFINE PAINT CO.

San Francisco, Cal., April 2nd, '98.

Vitality of Dogs.

During the summer of 1895, at the Jessie mines in Gold Run, near Breckenridge, Colo., a Scotch terrier bitch, "Dixie" by name, and the property of Mr. W. L. Wilson, Mgr., fell into a dry winze in one of the old workings, where she was found alive after being in the hole for thirty-two days. She had neither food nor water during this time. She was very fat when lost but very thin and weak when found. She recovered entirely.

At Sulphur Creek, Cal., an old hound belonging to Mr. H. A. Blanck fell into a dry disused shaft, 65 feet deep, on the 14th day of March, 1897, and was found and taken out alive on April 13th following, having been in the shaft thirty days without food or water. He also was very fat when lost and very weak and poor when found. He recovered entirely. I suppose this was enforced hibernation similar to that practiced by bears and like animals.

PH. REARDEN.

Sulphur Creek, Cal.

ACCORDING to current report, a Paris physician has discovered what will be of undoubted value to electrical men who are so unfortunate as to be burned by the electric current. A solution of one part picric acid and 75 parts of water will cure quickly the most serious burns occasioned by the electric current. The pain is removed without blistering or irritation. A yellow tint is left on the skin, which may be removed by a solution of boric acid.

AT DeLamar, Nevada, steam motors are being substituted for mules and horses for freight purposes. At Verdi such motors capable of hauling fifty tons have long proved valuable on steep grades. In Humboldt and Churchill counties borax and soda are similarly handled, the level country there admitting a speed of eight miles per hour. Gasoline is used for fuel with gratifying success.

DURING 1897 the gold received at the Sydney, New South Wales, mint for coinage amounted to 756,964 ounces; in 1896, 712,809 ounces.

THE annual meeting of the Northwest Mining Association for 1898 will be held in Spokane, Wash., December 14, 15 and 16.

THE Kennedy mine, Amador Co., Cal., is 700 feet below the level of the sea—2400 feet deep.

IN San Francisco the present value of a Mexican dollar for customs purposes is 44.4 cents.

Coast Industrial Notes.

—The *Times* reports the present market value of oil 85 cents a barrel f. o. b. Los Angeles.

—F. G. Barnes' mill, in Silver Lake, Cowlitz county, Wash., recently cut 79,000 shingles in one day.

—New gushers at Coalinga, Fresno Co., Cal., now give that district a daily petroleum product of 900 barrels.

—Eight thousand claims have been recorded with the agent of the Dominion government at Dawson City since September last.

—R. E. Russell, Mgr. Stockton and Tuolumne railroad, says the new railroad will be built to Sonora, Cal., before the end of '98.

—Track laying is finished on the Astoria and Columbia River railroad from Astoria, Or., to Goble, forty miles from Portland and sixty miles from Astoria.

—In Los Angeles hay and grain are scarce, and prices are high. Hay is quoted at $20 for wheat, $18 for oat, and $15 for barley. In San Francisco hay is held at $23 per ton.

—The Oriental Steamship Co. have ordered three vessels for the new line between Hongkong, Japan and San Francisco. One, to be called the America Maru, has a gross tonnage of 6000.

—The budget expenses of the Mexican Government, as estimated by Secretary Limantour, amount to $52,089,484 45 for the fiscal year 1898-99—an increase of $1,708,598.92 over the previous year.

—The provision in the sundry civil bill appropriating $400,000 for the construction of a deep water harbor at San Pedro, Cal., in accordance with the plans of the Board appointed by the President, was agreed to by the Senate on the 6th inst.

—President Corbin of the Spokane and Northern railroad has been granted a charter by the Dominion parliament for his proposed extension into the Boundary Creek country of southern British Columbia. The road will be built this summer.

—The gap in the Rocky Mountain Bell Telephone Company's line between Herron, Mont., and Mullen, Idaho, 125 miles, is to be closed, making a continuous line from Livingstone, Mont., to San Francisco, the longest telephone connection in the world.

—The steamship Alameda, from Sydney via Auckland and Honolulu, yesterday brought $2,000,000 in English sovereigns. This is a total since last fall of $18,500,000, and is in payment for the balance of trade in favor of the Pacific coast for wheat, flour, lumber, canned goods, etc. Since Feb. 25, N. Y. City has imported $25,000,000 gold from Europe.

—Americans who have taken a contract with Ecuador for building the railroad from Guayaquil to Quito are to get $17,432,000. At the starting point, Quito, the track will be 9350 feet above the sea. Chimborazo will be crossed at an altitude of 12,300 feet, and there are other points where 11,800 and 11,980 feet are reached. The road will be 404 miles in length, at an average cost per mile of $43,396 in gold.

—The Union Electric Power and Light Company, capital stock $1,000,000, has incorporated at Copperopolis, Cal., to divert power from the Stanislaus river and to furnish power and light for mines and towns; stockholders and trustees—O. Ames, S. Carr, Boston; G. McM. Ross, B. Johnson, Copperopolis; F. D. Nical, Stockton. The incorporation is understood to mean the resumption of the Copperopolis copper mines.

—Congressman DeVries of California this week introduced a bill to enable the United States Government to expend for the improvement of the Sacramento and San Joaquin rivers the moneys appropriated by the State for this purpose, with a view to its incorporation in the next river and harbor bill and to enable the Government to use the $300,000 appropriated by the State for the improvement of the lower Sacramento river.

—The Government report on coal production in the United States in 1897 shows that the value of the coal mined in twenty out of twenty-nine States was less by $2,000,000 than the coal mined in 1896. Oregon is one of the States showing a decrease. California produced 89,092 tons, valued at $200,866, or $2.25 a ton; Washington 1,434,112 tons, with a valuation of $2,777,637, or $1.94 a ton, and Oregon 100,311 tons, worth $311,500, or $3.11 a ton, the highest price in the country.

—Of Los Angeles oil territory, Prof. Strasburg tells the *Herald* that unless further local oil territory is developed soon the few remaining lots will all be drilled upon in the next thirty days, and present prices must advance. The amount of fuel oil above ground in the city of Los Angeles is in the neighborhood of 300,000 barrels, of which 225,000 barrels is in the market, with the present monthly consumption of fully 85,000 barrels. The production for the month of April should be about 90,000 barrels.

Recently Declared Mining Dividends.

Whitewater, British Columbia, $40,000; April 1.

Moon-Anchor, Colorado, 2½ cents per share, $15,000; April 1.

Boston & Montana, Montana, $3 per share, $450,000; payable May 20.

Swansea, Utah, 5 cents per share, $5000; payable April 11.

London & B. C. Goldfields, Limited, B. C., 25 cents per share; April 1.

Pennsylvania, California, 5 cents per share, $2575; payable immediately.

Personal.

D. B. PEASLEY is Supt. Washoe mine, West Point, Cal.

C. L. LANG is appointed Supt. Star mine, Sonora, Cal.

PRES. SWETLAND of *Power*, N. Y. City is visiting California.

J. W. GRAY of Oakland, Cal., has returned from New Mexico.

A. SUEDAKER becomes Supt. Silver Ledge mine, Ouray, Colo.

F. G. BULKLEY is the new Gen. Mgr. Ibex M. Co., Leadville, Colo.

W. H. STORMS, Supt. Agnes mine, Sonora, Cal., is in San Francisco.

F. O. WOODS becomes Gen. Mgr. Christmas mine, Cripple Creek, Colo.

P. C. DONOVAN is Supt. of the new company beginning work at Eureka, Nevada.

M. W. MATHER, Supt. Crœsus G. M. Co., Alleghany, Cal., is in San Francisco.

F. L. HINES is succeeded as Supt. Northern Light mine, Mercur, Utah, by R. G. Legg.

MGR. NORTON of the Tutthill Wheel Co. has returned to San Francisco from Los Angeles, Cal.

W. A. DENIS, Supt. Mountaineer mine, Nevada City, Cal., has returned home from San Jose.

W. T. ROBINSON, Supt. Spanish Bar G. M. Co., Mokelumne Hill, Cal., is in San Francisco.

J. A. FERGUSON, Supt. Red Point mine, Damascus, Cal., has returned home from San Francisco.

A. M. MCDONALD, Supt. Kanaka mine, Groveland, Cal., has returned home from San Francisco.

JOS. MCGILLVRAY has returned from British Columbia and contemplates an extended visit to England.

CHAS. BUTTERS sailed hence from South Africa on the 8th ult., and is expected here this month.

S. C. WILMANS, Supt. Boulder mine, Shingle Springs, Cal., has returned to the mine from San Francisco.

G. KARTSCHOKE, Pres. Champion M. Co., has returned to San Francisco from a trip to the mine, Nevada City, Cal.

T. J. PARSONS, Vice-Pres. California Miners' Association, has returned to San Francisco from Nevada City, Cal.

J. M. BUFFINGTON of Nevada City, Cal., will begin development of a quartz property this month near Forbestown, Cal.

MR. A. S. HALLIDIE contemplates departure for the Atlantic coast about the 10th prox., in the interest of the Wilmerding school.

A. H. LUBECK, for eleven years assayer of the Ontario Co., Park City, Utah, goes to the Carahaucra M. & M. Co., Yaulie, Peru.

J. R. COOPER has resigned as Mgr. of the D. & L. S. smelters, Houghton, Mich. He retires May 1st. His successor will be J. Case.

PROF. ANDREW LAWSON, the University of California geologist, has returned from the international meeting of scientists at St. Petersburg.

MAJOR HEUER, with Engineers Randall and Morse, last week visited Elkhorn, on the Sacramento river, where the proposed jetties are to be constructed.

D. J. MCDONALD has resigned as provincial inspector of mines to enter the service of the British Am. Corporation. He will be located at Rossland, B. C.

MRS. ELMIRA CLARK of the Carlisle mine, Butte county, Cal., proposes to put in a cyanide plant and has started on a trip of personal examination of similar operations elsewhere.

B. WINCHELL, Gen. Pass. Agt. Union Pacific, Denver & Gulf road, has been appointed Gen. Pass. Agt. St. Louis & San Francisco line, to succeed G. T. Nicholson, who will go to the Atchison, Topeka & Santa Fe as Pass. Traffic Mgr.

W. E. HAMPTON, Prop. and Gen. Mgr. Pacific Tank Co., is in the city for a few days on business connected with the San Francisco factory. Mr. Hampton for the past three months has been in Los Angeles looking after his new factory at San Pedro, Cal.

GEO. E. AMES, for many years agent of the Union Iron Works, and one of the oldest and best known mining engineers in the United States, has accepted the position of consulting engineer of the Anaconda, Montana, Copper Co., and left this week for his new home.

PROF. F. A. C. PERRINE is reported about to resign from Stanford University, Cal., to take the position of consulting engineer for the Blue Lakes Water and Electric Power Co., a full account of whose proposed operations appeared in the issue of March 19th.

MELVILLE ATTWOOD, the veteran mining engineer and assayer, is reported in his last illness at his residence in Oakland, Cal. Mr. Attwood made the first assay of Comstock ores in '59, and for over sixty years has been identified with mining and metallurgical interests in Europe and America.

E. G. LUKENS, Sec. Judson Powder Co. and Pres. Western Fuse Co., has returned from Denver, Colo., where he had been in conference with R. H. Ensign of Ensign, Bickford & Co., who own a fuse factory in Simsbury, Conn., and F. J. Fretter, Pres. California Cap Co., considering the project of erecting a fuse factory in Denver.

Commercial Paragraphs.

THE Pacific Tank Co. is now manufacturing three large cyanide plants, one of which goes to Mexico, and is the largest cyanide plant ever shipped from the United States, requiring the full capacity of sailing vessel to carry the material. This speaks well for home manufacturers.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 29, 1898.

601,334.—CASH REGISTER—Bradt & Kindleberger, San Diego, Cal.
601,519.—SPRING HEEL FOR BOOTS—J. Bresman, S. F.
601,550.—TOWEL RACK—H. S. Broughton, Stayton, Or.
601,406.—CARGO TRIMMER—J. C. Corwin, Tacoma, Wash.
601,431.—FLOATING DOCK—J. J. Cousins, S. F.
601,316.—LOCK—J. W. Dickson, Castle Rock, Wash.
601,242.—CAR FENDER—G. W. Douglas, S. F.
601,338.—METALLIC ALLOY—G. R. Evans, S. F.
601,561.—CULTIVATOR—V. A. Gleason, So. Riverside, Cal.
601,568.—PACKING BOX—P. I. Jacoby, S. F.
601,257.—GATE OPENER AND CLOSER—C. S. Jenkins, Los Angeles, Cal.
601,514.—CAN SOLDERING MACHINE—A. Johnson, S. F.
601,444.—STOVEPIPE COUPLING—A. E. Lotstrom, Spokane, Wash.
601,253.—EMBROIDERY HOLDER—J. C. Orchard, Tacoma, Wash.
601,524.—DREDGER—J. R. Parker, S. F.
601,380.—CORK EXTRACTER—C. F. Phillips, Los Angeles, Cal.
601,383.—BIBLE WHEEL—W. C. Reuter, Walla Walla, Wash.
601,589.—SAUCEPAN—A. Rochat, Golden Gate, Cal.
601,529.—SHOE PROTECTOR—J. O. Sharpless, Fairhaven, Wash.
601,288.—ROCK DRILL—J. P. Simmons, S. F.
601,605.—INDEX PORTFOLIO—H. J. Weeks, Santa Barbara, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FLOATING DOCK.—James J. Cousins, San Francisco, Cal. No. 601,431. Dated March 29, 1898. This invention relates to improvements in the construction of floating docks, such as are employed for docking vessels. It consists essentially in the novel construction and arrangement of compartments by which the dock is perfectly balanced and by which lifting pressure is directed to points in the vessel where the greatest weight lies, so that strains upon both dock and vessel are avoided. In conjunction with this is an arrangement and connection of the compartments and the pumps by which they are emptied, so that a portion of the compartments may be emptied by pump and another portion by the flow of the water therefrom by gravitation to reduce the cost and time, and by this means only as many compartments need be exhausted as are necessary to raise the particular size of vessel which may be upon the dock. This enables a dock which is capable of handling the largest vessel to be economically employed for the handling of small vessels.

DREDGING APPARATUS.—John R. Parker, Oakland, Cal., assignor to the Pacific Coast Dredging & Reclamation Co. of San Francisco, Cal. No. 601,524. Dated March 29, 1898. This invention relates to dredging apparatus, and it consists essentially of improvements in that portion of the apparatus by which the material is transferred from the plows or diggers which excavate it to a distant point where the dredged material is to be deposited. It also consists in a novel means for advancing the digging apparatus as fast as it is required for the purpose of excavating fresh ground. The object of the invention is to provide a means for connecting the rigidly supported conveying pipe with the corresponding rigid connection between said pipe and the digging or excavating mechanism in such a manner that the latter may be advanced as the necessities of the work require without the employment of any flexible sections in the conveying pipe. It consists also in the formation of a swivel joint between the two rigid pipe sections which will allow that portion connecting with the digging apparatus to be swung in an arc of a circle with relation to the joint, so as to excavate to any desired width.

Recent California Mining Incorporations.

Temescal G. M. Co., San Francisco; capital stock, $1,000,000; subscribed, $250; C. B. Filley, J. E. Stock, J. F. Holling, H. W. Gray, F. McPherson.

Little Dick M. Co., Santa Barbara, Cal.; capital stock, $6000—all subscribed; A. B. Williams, J. H. Burson, A. C. Grant, W. Ealand, C. Leveday.

San Domingo G. M. Co., San Francisco; capital stock $1,000,000, subscribed $500; C. H. B. Laughlin, B. G. Somers, C. W. Cross, M. Trueman, A. H. Washburn.

Alaska Hydraulic S. Co., San Francisco; capital stock $5,000,000, subscribed $4,110,000; W. H. Acamo, F. J. Symmes, F. H. Wheelan, J. W. Stetson, W. E. Holbrook.

Mazeppa G. M. Co., San Francisco; capital stock $600,000, subscribed $400,000; D. R. Oliver, W. H. Straub, T. S. Hender, G. L. North.

San Luis Rey M. Co., Los Angeles; capital stock $1,000,000, all subscribed; D. S. Redican, C. B. Atkins, R. F. Del Valle, F. L. Binford.

The Electro-Zinc Slimes Process.

From the *South African Mining Journal* of November 20th, '97, was taken an account of an experimental plant, and of the methods pursued by Mr. Bettel for saving the solid portion of the slimes effluent leaving the sands plant, for its admixture and agitation with cyanide solution, for the decantation and filtration of the gold liquor, and for the final precipitation of its gold contents. The plant was erected at the Comet-Angelo reduction works. It was then explained that the clear gold liquor is decanted off through a floating syphon of special construction, and is delivered into an equalizing tank of three compartments, which by means of a differential ball-cock arrangement allows of the discharge into the extractor boxes under an even head. The extractor boxes in use are of special design, 30 feet by 6 and 3½ feet deep, divided into seven longitudinal compartments for anodes and six longitudinal compartments for cathodes—these, again, being subdivided into twelve compartments, giving eighty-four anode and seventy-two cathode compartments. The anodes consist of sheets of lead coated with a non-conducting insoluble varnish having mixed with it a conducting material (perplumbic-graphitate) practically unoxidizable. The cathode compartments contain perforated zinc cages fitted with zinc shavings. Both cathode and anode boxes have terminals, which are fastened to the respective positive and negative poles of the electro-plating dynamo in use, which has a capacity of 400 amperes under twenty-five volts pressure. The separation of the cathode and anode compartments is effected by means of a specially prepared canvas, which, while not interfering with electrolysis, prevents the undue mixing of the anode alkaline solution with the cathode auriferous KCy solution.

The trial run having been concluded and as full a cleanup as possible having taken place, the general results obtained have become known. The *South African Mining Journal* claims that the scheme of the process has been entirely misunderstood by the majority of technical men whose criticism is of value, believing the general impression to be that the total extraction is the test by which this new process must stand or fall. The inventor states with emphasis that nothing would induce him to erect or work another plant on lines similar to that he is now using. Circumstances rendered it necessary that a trial plant should be erected in great haste, consequently neither site, design nor workmanship could be subjected to that searching discrimination which only a full purse and ample time could ensure. The site had to be arbitrarily fixed; the time for erection was compressed into four and a half months, too short for the purpose in view; and the design was governed entirely by the choice of material which could be got within that short period and with the funds at his disposal. Moreover, the product which it has fallen to Mr. Bettel's lot to handle as slimes—throughout the whole of his trial run—had, through circumstances unpreventible on his part, so large an admixture of sands as to have been recognized by both J. R. Williams and Chas. Butters as no fair test for a slimes method. When, therefore, the objection is raised that the electro-zinc process has at its trial run secured only a theoretical extraction of 59.59 of the assay value of the product treated, a fraction of the truth is told.

In regard to the material delivered at the plant, the *Journal* says the erection of the spitzkasten at the tail end of the sands-plant ensures a very satisfactory product. Previous to the erection of the spitzkasten, the product contained 30 per cent of leachable sands, which delayed the working, wore out the centrifugal pumps, were only slightly affected by the weak solutions in use, and, owing to the limited number of tanks, the treatments had to be confined to two, in place of the three usually employed in other slime plants. Under the conditions prevailing at the plant, mechanical agitation could not be used, and the agitation by pumps was carried on under unfavorable conditions.

The solution of the gold is a side issue, because the results obtained by both Mr. Williams and Mr. Butters prove how excellent are the results which are to be obtained by at least two of the several possible methods if the plant is properly equipped.

The sole feature of the present plant was the production of gold solution to be utilized in testing Mr. Bettel's new process—the electro-zinc method of precipitation. Therefore, it is only fair that the process should be accepted or condemned solely by the standard of its precipitation. The East Rand management are responsible for both the samples taken and their assay. On this basis, the average of the solution value after precipitation works out at .108 dwt. per ton of solution, under circumstances admittedly unfavorable. Compared with the normal results of the other method—which averages some nine grs. per ton of solution, and frequently rises as high as eighteen grs.—this result of two and a half grs. is undoubtedly satisfactory. Furthermore, in the older process only part of the bullion won is collected at the cathode, the balance having to be recovered from the Prussian blue, and from the anode, at an appreciable loss to the companies. In the new process, the only by-product (apart from the usual cyanide slags) was some sixty-one pounds of very fine clay sediment which had passed the filter; the fine gold contents of this amounted to thirteen ozs., equal to 10s 6d in money value—probably a loss not worth any effort to recover. At the request of the directors—who wished for a close clean-up—the whole of the zinc shavings, amounting to 3000 pounds, was dissolved by sulphuric acid. The slimes produced were smelted in clay liners just fitting into a No. 60 plumbago crucible—the flux being of an oxidizing nature; the lead and the bulk of the copper, together with some silver, were thereby retained in the slags as oxides and borates, and a bullion of 885 parts of fine gold per 1000 was obtained. Taking the weight of the bar, some 257 ozs., and adding thereto six ozs. of gold in stock solutions with the amount of fine gold in the clayey slimes, 51.2 per cent of gold out of 59.59 theoretical, has been accounted for. To this has to be added the gold still to be secured from slags and pots, which will probably amount to further 6 or 7 per cent, and in the ordinary way will go into the next cleanup.

One of the objections raised against the new method is the use of perforated zinc cages for holding the zinc shavings; it was contended that so much gold would adhere to the cages and that a substantial amount of gold would be locked up in the boxes. This was not proved to be the case. ; the cages were washed in a very dilute solution of sulphuric acid, and no difficulty was experienced in removing practically the whole of the adhering gold with no damage to the cases.

In the opinion of the *Journal* the feature which will most recommend the new process to mine managers is the ease with which the zinc shavings utilized in it can be taken from the electro-zinc boxes and be used in the place of fresh zinc in the precipitation-boxes of the normal zinc process. The precipitated gold, although in a spongey state, adheres so firmly to the shavings that the latter can be rinsed in a weak solution or water for the purpose of ridding it of the clay slimes, without the removal of more than a trace of gold ; nor does it adhere so firmly as to resist removal by mechanical means. The zinc thus slightly coated with spongey gold is in a better condition to effect precipitation with stronger solutions of the sands process than are clean zinc shavings.

Under normal conditions the electric installation works smoothly and requires little attention.

Another feature is that it is possible to let the zinc shavings stand in the boxes without electricity passing through them for as long as eight days and the precipitation (when the current is passed through) proves to be perfect.

Working Out the Details.

Once in awhile the *Tribune* receives a letter describing briefly some proposed invention, and winding up with some such phrase as this: "I only throw out the crude idea now; but I think it would be easy to work out the details." Sometimes the writer intends to conduct the latter part of the proceedings himself; sometimes he wants a manufacturer to undertake the task. But in either case, he considers the "working out of the details" a trifling matter, and usually believes that the main part of the work has already been done in conceiving "the crude idea."

This is a very common, but really a serious, error. A great many things which look all right, while still existing only in the mind of the inventor, develop some unforeseen defect as soon as they are put to a practical test. Long before Edison's day, for instance, other men had the "crude idea" that light could be produced by heating to incandescence a filament of some substance by sending a current of electricity through it. In fact, they knew it. But none of them produced a successful lamp. And it took Edison five or ten years, and cost him many thousands of dollars, to "work out the details." He found that platinum was unavailable for a filament, and that carbon was better. He sent men all over the world, to the jungles of India and to the forests of the Amazon, to get different kinds of vegetable fiber with which to experiment, so that he might find the best. Then he discovered that a better vacuum was needed, instead of the bulbs, than could be secured with ordinary air pumps, and so he went to work to invent an improved air pump of his own. Besides these other important details, there was this essential problem requiring attention: How could he persuade just the right amount of electricity to leave the main wire and go into each lamp. Too little would leave the lamp dim. Too much would burn it out instantly. Some of the most famous electricians in the world said that the thing could not be done. Edison did it, though; and if he had not achieved this success, his lamp would not have worked. A dozen other such instances, in the career of Edison alone, could be cited. There is one, taken from the life of Sir Henry Bessemer, of England, who died a few weeks ago, having conferred more benefit on the civilized world than any other inventor of the present century, and having derived over $5,000,000 from his patents.

Forty-five years ago steel cost $250 or $300 a ton. Now it can be had for $20 or $25. The reduction in price is partly the result of the use of machinery in the operations of manufacture, and of the cheaper transportion of ore. But the chief factor in the change is the invention of Bessemer's process of making steel. Pig iron contains too much carbon. Sir Henry melted it in a huge egg-shaped flask, called a "converter," forced powerful air jets into the bottom of the latter, and thus burned out the impurities. But his invention was not complete when he made it public in 1856. He experienced great disappointment, suffered vigorous criticism and denunciation as an imposter, spent $50,000 or $100,000 in addition to his first outlay, sent all over the world for samples of ore and pig iron, and conducted elaborate chemical experiments before he learned how to overcome three difficulties that he had not foreseen at first. Nearly four years were consumed in this task. And if he had been a man of less patience, thoroughness and energy, he would have failed.

We cannot all be Edisons and Bessemers. Only a few inventors have the ready money to expend as these two men did. But they both began life as poor boys. They made their own fortunes. And they did so even more by "working out the details" themselves than they did by their "crude ideas."

Making Blue Prints.

Prints from photographic negatives or from drawings made on transparent material (like draughtsmen's designs) are frequently obtained with "ferrocyanide" paper. Such copies are called "blue prints." It would be cheaper for a man to buy such paper ready made, if he does but little work with it. Many engineers and photographers prepare it themselves, though, when they need considerable quantities.

It is necessary that the paper should be sized, to begin with. Some grades of note paper already have enough size; or ordinary albumen paper, which has not been sensitized, will do, if first dipped suddenly into boiling water to set the albumen. More porous paper may be coated with arrowroot starch, applied with a sponge, and then dried. A grade of paper, known as Rive's plain, suitable for this use, can be obtained from dealers in photographic supplies. This avoids the necessity for further sizing.

To sensitize paper by the ferrocyanide process, one should have two solutions. Put one ounce of ammoniocitrate of iron (or citrate of iron and ammonia) in four ounces of distilled water. Put one ounce of red prussiate of potash (or ferridcyanide of potash) in another four ounces of distilled water. Keep these solutions in separate bottles, which should have two or three thicknesses of brown paper pasted around them to exclude the light.

Pour equal quantities of these liquids in a clean, shallow glass dish, and mix thoroughly with a glass rod. Lay the paper on the surface, and let it float for two or three minutes. It is necessary to coat only one side. The superfluous fluid may be removed when the paper is lifted by drawing it over a glass rod. The chemicals may also be applied with a clean sponge while the paper lies flat on glass or a board. This operation, and that of drying before a fire, should be conducted in a dark room and the paper should then be protected from light in a bureau drawer in a closet. Better results are obtained with paper that has been freshly prepared than with old stock.

In making prints from a negative, one lays the paper under the latter, as in making a "silver print" or a "bromide print," pressure being used to bring the paper close against the negative. Draughtsmen lay their ferro-cyanide paper under the tracing, cover the latter with glass, and press the three together in a printing frame, that looks very much like a picture frame. Then expose to the sunlight for several minutes. Sometimes, if the daylight be feeble, an exposure of an hour is necessary. Wash the print in water until the free chemicals are entirely removed. Four or five half-minute baths will do it. Some photographers add to the sensitizing mixture five drops of a 10 per cent solution of bromide or ammonia, to make it work more slowly. And a few drops of citric or hydrochloric acid are sometimes added to the first bath into which the print is dipped when taken from the frame, but these precautions are not always observed.

THE *Review* thinks that in case war is declared between the United States and Spain it is probable that the electrical fraternity will play a very important part in whatever actions may ensue. The setting and operation of submarine and subterranean mines involve considerable technical and engineering skill and a knowledge of electrical engineering. The American Institute of Electrical Engineers numbers among its membership many expert electricians who would undoubtedly volunteer their services to the Government for such work. A number of electricians have already enlisted as privates in the two new artillery regiments recently created, and it is undoubtedly a fact that when the real need of the services of trained electricians is made apparent it will be at once met by volunteers.

Mining Summary.

CALIFORNIA.

Amador.

The Tellurium mine at Pine Grove has been bonded, and work resumed on the old tunnel. ——The Valparaiso, near Jackson, on which work ceased, has resumed. —— Questo & Co. have discovered a 4-foot ledge in the Silver Star mine, near Jackson Gate. —The Anita mine resumed sinking. —— At the Alma the bond has been extended and operations will soon be renewed.

The *Ledger* says that the completion of the new shaft on the Wildman-Mahoney mine will necessitate more stamps, and the plan is to add 120 to the 80, increasing the capacity of the mines to about 750 tons daily. The next work at the Oneida after the ledge is encountered in the new drift will be the unwatering of the old shaft. The concentrators at the Argonaut are saving a ton of concentrates per day. One-quarter of this passes over the tailings plant.

Butte.

Work will soon be resumed on the Missouri and Burlington mines near Forbestown.

At Enterprise work is being pushed on the Mecham and Bright Star. Good ore is reported in the tunnel.

At the Pactolian mine, near Hurleton, men are engaged running a tunnel. The dredger near Oroville is working steadily. They contemplate the purchase of several thousand acres of land.

Calaveras.

G. Taylor discovered a good ledge near Murphys. —— D. H. Roberts is taking out ore at the New Calaveras mine —— D. McDonald has resumed work on his Buckhorn claim. McDonald & Co. are erecting a cyanide plant on the old Calaveras group —— At the Keltz mine, at West Point, twelve men are tunneling. The ore is shipped to San Francisco for reduction and has always paid a dividend over the cost of transportation and treatment. ——The Great Eastern mine, near Angels Camp, has been bonded to C. D. Lane. The Great Western has also been bonded to the same party for thirty days for $20,000; 5 per cent of the purchase price was paid.

At the Boston mine, Mokelumne Hill, the shaft has reached 1000 feet. It is stated that the mine will not be operated this summer owing to the uncertainty of the water supply. ——The last payment of $3000 was made on the Petticoat mine at Railroad Flat.——At the Gwin mine the south shaft has reached 40 feet below the 1000 foot level of the old works. The shaft, after a lapse of fifteen years, was found in a good state of preservation. At the north shaft they are taking ore from the 1400 level at a distance of 1100 feet from the shaft. The 40-stamp mill crushes 150 tons of ore per day.

Citizen: The Lockwood property, near West Point, is being unwatered. Work has commenced on the Rowe & Jenkins, and on the Stager mines. The Champion Co. has cleaned the shaft to water level. Machinery will be erected and pumping begin. A mill test of the old waste dump, of which there are several hundred tons, netted $4 per ton. The company will erect a mill at an early date.

Chronicle: W. T. Robinson of Mokelumne Hill has secured the right to mine the Mokelumne river for a distance of five miles. He intends to use a dredger and the outfit will cost in the neighborhood of $35,000.

The price paid for the Boucher & Brackett gravel mine, in Chili gulch, by J. Burton was $3000.

El Dorado.

(Special Correspondence).—Work continues on the German mine, near El Dorado, with seemingly satisfactory results. This company recently purchased the 10-stamp mill on the Gerhart mine, on which work was discontinued for lack of capital. It was another instance of an expensive surface plant before sufficient development work warranted the outlay. The Pocahontas, with its fine plant of compressor and stamp mill, is still at the mercy of the sheriff, and the development of the mine, like the Gerhart, succumbed to the machinery, for which no grist was produced to grind. Thus the redeeming features of promising properties are lost sight of by expenditure of the limited money at disposal above ground, and the county in general made to bear the blame. The Gentle Annie mine is crushing a good grade of ore from the 400 level. The Limpensell property, under bond to Diamond & Gehricke, is sinking by contract. Power drills are in use.

A discovery of good ore in a strong ledge was made in the Flagstaff, near Grizzly Flat. The renewal of activity in taking up abandoned mines in the vicinity of Grizzly is rewarding the operators in several mines below the 700 level. This is notably the case in the Mt. Pleasant, Good Hope and Flagstaff. This resumption of work on old properties is giving an impetus to development of other properties in the neighborhood. In the northern portion of the county from the American river to Kelsey and Georgetown new life is manifest, as is evident from the reopening of the Summit and Rising Sun properties and the shafts being sunk on new properties. In the neighborhood of Garden Valley and the Taylor mine prospectors are meeting with some success in the discovery of ledges. The Boulder mine, in the vicinity of Shingle Springs, with its systematic development work, is rapidly proving itself a paying investment.

Placerville, April 4th, '98.

Kern.

(Special Correspondence).—There is an electric power plant proposed for this camp; the promoter of the scheme is J. W. Eddy, backed by capitalists of southern California. The plan is to generate power at the south fork of Kern river and transmit it to Randsburg, a distance of thirty-six miles. The different mines here have subscribed for over 500 H. P. Col. Eddy is now in Los Angeles completing arrangements to begin work immediately. The water mains for the Randsburg water works are being distributed and laid in the streets to-day, and within a few weeks we hope to have water.

Randsburg, April 4th, '98.

(Special Correspondence).—The owners of the Mammoth mine are sinking a winze and crosscutting from No. 4 tunnel. They are reported taking out ore running $40 per ton.

Welch & Gilliam have given a contract for an upraise on the Root mine, to be used as a working shaft.

The French Gulch Gold Dredging Co. have shut down and are selling off their machinery.

Lassen.

The Golden Eagle mine, at Hayden Hill, has been sufficiently developed to warrant the erection of machinery, which is being placed for the reduction of ore.

Madera.

C. A. Shattuck & Co. are developing a claim near Coarse Gold. The ledge is 4 feet and fair grade. The Gold Gulch M. Co. shaft has reached 190 feet. The pay streak is 5½ feet wide. The Krohn mine is 217 feet deep. The ledge is 7 feet wide. The ore averages $30 per ton.

Mono.

Concord & Yerrington have taken possession of the Molus mine, near Bishop, and will erect a 10-stamp mill without delay.——Tests of ore from Copper Mountain district are being made by the leaching process. If successful, the bodies of rebellious ores in that district will be thoroughly developed.

Napa.

The annual report of the Napa Con. Quicksilver M. Co. gives the following figures for the year ending Dec. 31st, '97: Net proceeds sales, $168,871; quicksilver on hand Jan. 1st, '98, since sold, $47,075; increase in cash supplies, $1621; total expenses, $123,290; net earnings, $94,277; dividends paid, $70,000.——Ætna Con. Quicksilver M. Co. gives the following figures for the year ending Dec. 31st, '97: Net proceeds sales, $101,020; quicksilver on hand Jan. 1st, '98, since sold, $25,200; increase in cash supplies, $4798; total expenses, $78,332; net earnings, $52,686; dividends paid, $40,000.

Nevada.

(Special Correspondence.) — The property owned by C. F. Wright, two and one-half miles from North San Juan, has considerable development. One tunnel has reached 135 feet on the ledge, which at some greater length will have a depth of 700 feet. The croppings are from 75 to 100 feet wide. The ore is rather low grade, averaging from $2.50 to $6 per ton, with large percentage of sulphurets. The ore chute can be traced for 1600 feet. The property is favorably situated to be operated as a quarry. Water is one-quarter mile distant.

At the Wisconsin mine near Grass Valley about fifty men are at work, mostly on the tribute system. The shaft has reached below the 700 level. The ledge is small but of fair grade.

The Pennsylvania is said to have come into a new ore body on the 700 level while making an upraise from the 800.

The North Star Co. continues drifting in the Massachusetts Hill property on the 1200, 1300 and 1400 levels. The ore is hauled one mile by wagon to the North Star mill.

The development of the Hastings gravel mine at Nevada City shows encouraging signs of an approach to the channel.

Nevada City, April 4th, '98.

The gravel mines at Relief Hill are all working. More men have been put to work recently. The Waukershaw has come into a rich pay streak. The Reddick gravel mine, near Nevada City, is said to have struck gravel that yields $15 per car.

The Live Yankee G. M. Co., near Graniteville, a local company, have completed 1400 feet of tunnel. They have expended $9000 in development. They expect to bottom the channel within 300 feet. In the Union quartz mine the tunnel has reached 400 feet. The ledge in the Mayflower is 8 feet wide and the ore is fair grade.

The Gold Flat mine is under new management. The ten miners operating it the past year relinquished their bond and it reverted to the owners, the Weissbein Bros., who have put men to work and will thoroughly develop the property. The shaft is down 350 feet.

The *Tidings* says that the Summit mine will resume operations. Work ceased on this property about a year ago because the machinery was too light for the heavy flow of water. New machinery is to be placed.

The Old Home mine, near Blue Tent, has resumed operations.

Union: Near Graniteville, in the Mayflower mine, an 8-foot ledge of free-milling ore was discovered. The California Queen, near Hombrook, struck a 5-foot free-milling vein of good ore. This mine was worked fifteen years ago, but the ledge was lost and has been idle until recently. The ledge was found within 2 feet of where the former owners quit.

Union: The Pennsylvania mine at Grass Valley has uncovered a new ledge on the 700 level, and within thirty days fifty stamps are to be added. Kidder & Brown have sold their interest in the property to Clinch & Thomas Bros. Fifteen loads of ore from the Norambagua mine yielded $40 a load.

Placer.

R. L. Dunn contemplates the erection of a cyanide plant at the Dardanelles mine, near Forest hill.

Plumas.

Hill & Schneider are developing a quartz property at East Branch.

Riverside.

A discovery of an ore body of good value is reported from the north end of the county. Adams Bros. are the owners of the property.

San Diego.

(Special Correspondence). — The Helvetia mine, in the Julian district, is reported sold at a good price. On the 1st inst. the Ranchita mill and mine resumed work, after a brief idleness. The Ranchita is one of the best producers in the Banner district. The air compressor is in place on the Kentuck, near Banner, and the 1200-foot tunnel will be commenced in a few days. M. Holland of San Diego, who owns an extension of the Ranchita, recently milled several thousand dollars worth of $30 rock. The North Star mine, in the Banner district, is reported sold at a satisfactory but not named price. Development work was resumed on the Mountain View mine, near Stonewall, on the 1st, after two months idleness, owing to bad weather and snow on the ridge. The Laguna M. Co. has received a request for price per ton f. o. b. at San Diego for 100 tons of their high-grade stibnite ore.

San Diego, April 2nd, '98.

Receiver Pauly of the Golden Cross mines in his third report, which covered the month of January, shows that the clean-up amounted to $44,941.48 and there was paid out $29,669.69. Returns from other sources amounted to $1186 88. There were 218 men employed during January.

San Joaquin.

A. Rosenbauer of Stockton, whose weather predictions are said never to have failed, has wagered $4000 that there will be 1½ inches of rainfall during the current month.

Shasta.

A half ton of silver ore from the Igo district produced 200 ounces silver and some gold.——In the Muletown district P. W. Pyne sold the Golden Jubilee group to Mooer & Johns, who will continue development.——Wise & Co. are running a tunnel on a ledge of fair grade ore. ——The Midas M. Co., near Hall City, employs sixty men, and is producing good values. The cyanide process is in use. Capt. Roberts contemplates erecting a hoisting plant on the property.

M. B. Butler & Son have struck a body of good ore in their mine near Delta. The property is well developed. Heretofore the ore was worked by arrastra, but the new find gives opportunity for larger operations. A contract has been made to crush 200 tons at a custom mill. Hicks, Travers & Co. have also contracted to crush 200 tons from their mine at a neighboring mill.

Development work is pushed on Harrison Gulch and Hall City properties. Boswell & Johnson are opening a claim near Hall City that is reported promising.

Democrat: F. Panter has tapped the lode in the Evening Star at Whitehouse. The ore is high grade. The National Con. has ten stamps in operation and employs thirty men.

It is reported that copper ore has been found near the Altoona quicksilver mine.

Sierra.

It is creditably reported that Supt. Jones has reached a gravel deposit in the Lucky Dog property of good depth that is paying $6 per load.

The Plumbago mine continues its rich yield both of good milling ore and of specimen production in fair quantity. The last output, shipped this week, is $12,000.

Siskiyou.

The tunnel on the Hazlit mine near Henley has reached 500 feet on a 6-foot vein that averages $12.50.

The Cherry Hill mine near Yreka has struck the ledge at a depth of 650 feet. The ore returns good values and carries both silver and gold.

The Siskiyou M. Co., near Happy Camp, is reported to have realized $19,000 from three months' work. The property is on the Klamath river, about fifty miles from Yreka.

News: C. E. Humphreys at Barkhouse realized $1150 from fifteen tons of ore. White & Musgrave discovered a 4-foot ledge near Humbug, from seven tons of which they realized $25 a ton. A 2-foot vein of ore was cut in the Hunter mine at Cherry Creek. Work on the Smith mine is progressing. They are working a 2-foot ledge which averages $15 per ton. Costello & Hart have a 200-foot tunnel on a 15-inch ledge.

Trinity.

The Highland mine at Cox Bar has made two satisfactory cleanups, but is making short runs for lack of water.——Connection has been made in the LaGrange tunnel. The accuracy of the survey and the work is shown by the fact that at the place of meeting the bottoms of the two tunnels differed only three-quarters of an inch and the sides but a few inches. The tunnel is 8409 feet long, 6x7 feet, and has a grade of 10 feet to the mile. Work was begun on it July, 1895, and from that time forty men were employed. The water of Stuart's Fork will be turned through it and will afford a constant supply. A complete description of this property, together with illustrations, was published in the MINING AND SCIENTIFIC PRESS Feb. 19th.

Searchlight: The placer properties of Junction City and vicinity have not experienced the hardships of the smaller properties in the lack of water; but, unless an unexpectedly wet spring ensues, the hydraulic season of these properties will be materially curtailed. The Cle Fse mine at Junction City, through the means of an inverted siphon and extended ditch line, is furnished an abundant supply of water from Canyon creek. Fifty men are employed. At the Chapman & Fisher mines, near Junction, the reservoirs have been slowly accumulating water and hydraulicking has been slow. The Haas mines at Junction City depend for water on Clear creek, and operations have been seriously affected. At this time last year three clean-ups had been made, against one for this year. Sheridan Bros. mine has been correspondingly retarded. The Gribble mines have accomplished practically nothing, owing to the poor season, while at the Murphy mine Supt. Giezan manages to pipe only a half hour daily. Some work has been done at the Burger and Dannenbrink mines and the Wallace properties. Markwell & Keenan are doing considerable sluicing. At the Red Hill mines the short rain supply has been keenly felt. Fourteen men are employed. For ten months water has been securable less than eight hours daily. Four giants are used.

Tuolumne.

Democrat: The Dead Horse mine at Summersville is sinking in the main shaft, which has attained 1450 feet. The vein in the bottom shows 4 feet of ore. The Birney & Wainwright pocket claim on Bald mountain last week produced $1300. The Spring Gulch mine will soon be reopened. The Lady Washington changed hands on the 1st of April; the new owners will start a shaft on the ore chute. The Agnes mine is being developed by W. H. Storms. The property contains two veins, one low grade, the other carries an average width of 10 inches sulphide ore. The Tri-Color Con. M. Co., who will operate the Patterson properties near Tuttletown, have plans for a 50-stamp mill, and made surveys for the power plant. The company has sufficient power to operate 100 stamps, summer or winter.

NEVADA.

The Boston-Nevada Co., operating in Mason Valley, has 400 tons of copper ore ready for smelting.

S. G. Weston has sold the Cuag group, near Mountain City, to New York capitalists for $75,000. The property is principally copper, but carries gold and silver. The company contemplates the erection of smelters.

The Cuyahoga G. M. & M. Co., composed of Ohio capitalists, have secured three claims near Dayton and begun development. F. C. Everett is Gen. Mgr. It is his intention to put a mill on the property this summer.—— The Delphi M. Co., composed of Ohio people, secured three claims in Smith valley and will operate them extensively. Much development has already been done. Work will be pushed and possibly a cyanide plant erected.

The Heleza Placer M. Co. has secured 700 acres of gravel near Carson and is preparing to bring water on the ground. Seventy yards of gravel hauled one and a quarter miles for washing yielded $3.70 per yard for thirty-five yards, and from thirty-six yards $4.17 per yard was obtained.

OREGON.

Bradbury Bros. made a good quartz find near Baker City.——The Bonanza mine, near Baker City, has an annual output of $300,000. Extensive improvements are contemplated in both mine and mill. A. Geiser of Baker City is Pres. of the company.

WASHINGTON.

At the Schoop-Nader placer bars on the Pend d'Oreille work is progressing. Of the tests made, none have failed to show colors.

The Republic M. Co. No. 2 at Republic received $20,000 from C. S. Warren as trustee for 250,000 shares of stock, the money to be applied for development purposes.——F. H. Oliver, as agent for Butte and Spokane men, paid $25,000 for a half interest in the Lost Lode claim at Republic.——The Quilp claim at Republic has begun development work. The property is owned by Spokane people.

The Rebate mine at Republic has been bonded to J. M. Burke, for a company, for $30,000. Three shifts have been put to work. ——The San Poli mine came into a new ore chute that assays $24 gold.

BRITISH COLUMBIA.

(Special Correspondence).—The Channe M. Co. are working their Hanson island properties, Phillips Arm district, north of Vancouver city. They claim that assay certificates show that 2 feet of the main ledge will average $28, chiefly copper, and 4 feet will average $14, and that concentrating test showed the ore would reduce from ten and one-half to one ton. The company are shipping their $28 ore continuously to Swansea.

Two matting plants are being arranged for coast properties. A combination of the Vivian and Swansea people will erect one, it is said, to handle coast ores, while E. Blewett and Chicago capitalists have a matting plant en route from Chicago capable of treating 100 tons a day. Mr. Blewett states that the plant will be erected either on the island of Vancouver or in the suburbs of Vancouver.

Free milling properties continue to be a great disappointment on the coast, as far as actual results are concerned. All of them start out as high-grade propositions with small-dimension mills, and most of them turn out low-grade propositions which will take a large amount of money and much care to work. British Columbia has proven to date to have six or seven low-grade free milling mines, but no high-grade ones.

At Lillooet the Golden Cache is being worked as a low-grade property. The company now claim a rich narrow pay streak running through the ledge, assaying $200 to the ton, and the whole ledge mineralized, the rest of the ledge outside of the pay streak running sufficiently high to give a return of $1 a ton above expenses.

Vancouver, B. C., April 4th, '98.

The ore and matte shipments from Nelson for the week ending March 26th amounted to 2051 tons, of an approximate value of $86,560. The shipments for March are 9049 tons, valued at $371,949, and for 1898 up to date 27,227 tons, valued at $2,718,576.

Up to the 7th ult. the Government granted eighty-four leases for dredging in the Yukon river and tributaries, covering a distance of 1184 miles. The revenue derived from these leases is $110,000.

The net earnings of the Whitewater mine in the Slocan to March 26th last amounted to $194,000.——The Enterprise mine has 600 tons of ore at Slocan and is working thirty men. ——J. M. Harris of Sandon will ship to Swansea, as an experiment, 100 tons of zinc ore.—— The Hall mines' results of the company's smelting operations for the twenty-two days ending the 25th ult. are 5436 tons of ore smelted, yielding 321 tons of matte, contain-

ing 125 tons copper, 77,020 ounces silver, 402 ounces gold.

The Cariboo M. & S. Co. at Camp McKinney intend to purchase an additional twenty stamps. They have acquired an option on several adjoining properties for $30,000. The Golconda group has been bonded by the British Columbia D. Co. for $35,000.

ALASKA.

(Special Correspondence).—Skaguay presents the appearance at its docks of a metropolitan port. The great number of passengers arriving and the freight unloaded here give it importance. The wharfage is fairly good. Four large warehouses are completely packed and a fourth is in course of construction. At present the ground is frozen, but when the thaw begins the present sea of ice and frozen gravel will make this embryo city one sea of mud and slush. The trip over the summit, however, is preferable from Skaguay, as the road is not steep and only 2800 feet of an elevation, as against 3500 over the Dyea route.

A fairly good wagon road has been built for twelve miles on the Skaguay route. The toll charged for freight over this road is 2 cents per pound. The report went out that miners would refuse to pay the toll, but this seems unfounded. At any rate, the Government has issued instructions to protect the owner of the road.

I have had a number of quartz samples submitted to me which, in a horn test, ran from $60 to $70 per ton. There is a good percentage of sulphurets, but I have no means at hand to assay their value. The reported rich gravel finds on the Big and Little Salmon rivers and in Walsh gulch are rapidly depopulating Skaguay. There will be considerable prospecting done this summer all along the coast from Victoria, and on the Sound and the islands as well. That the opportunities are not so favorable for quartz mining here as they are in California needs no explanation. Nevertheless there will be considerable enterprise expended in this line in Alaska this year, and it will give mining in general a strong upward tendency.

The new gravel discoveries, of which I spoke in the outset, are approximately from 80 to 100 miles from Selkirk in an easterly direction. As they are in line or in the same belt as the Klondike fields, it is thought they will prove equally rich.

Skaguay, March 25th, '98.

THE KLONDIKE.

In addition to the plans of the Geological Survey for exploration in Alaska, the Treasury Department is starting four expeditions to explore the Yukon river, Copper river and other water routes of the Territory, Congress having appropriated $100,000 for the purpose.

IDAHO.

(Special Correspondence).—J. S. F. Batchen and twelve others have sold a placer tract of 250 acres on Boyle, California, Wolf and Granite creeks, near Placerville, to the Blue Rock Dredging Co. of West Virginia for the stated price of $15,000. The purchasing company purposes putting in a dredging plant with a capacity of 3000 cubic yards per day.

Placerville, March 31st, '98.

The Hiyu mine, near Florence, has a new vein 20 feet wide. The company will add concentrators, a heavier hoist and additional stamps.——The first payment of $2000 was made on the Sunset group, near Wallace.

There is 8 feet of snow on the level at Pierce City. The indications are that considerable placer mining will be done in the vicinity of Pierce the coming season.

An ore body of good values has been opened in the Illinois mine, near Idaho City. Two dredges are being built to operate near Placerville.——The Morning Star mine, near Grimes Pass, is running day and night, and water is ample.

The mill at the DeLamar formerly run on the pan amalgamation process has been replaced by the new cyanide leaching plant. The *Avalanche* says ten iron leaching tanks, 10x20 feet, of a depth of from 3½ to 4 feet, each with a capacity of about twenty-five tons, are in operation. The ore after being crushed to admit it through a 1-inch screen goes to the leaching tanks, two of which are filled and two discharge daily, making the present number of tons treated each twenty-four hours about fifty. The ore is placed loosely in the tanks, not packed, and the cyanide solution, piped from two large storage tanks, is slowly percolated throughout the mass. Four days later the solution is washed and drained into a sump tank below the leaching tanks, and from there pumped up to the precipitating tanks in the upper story. It is then forced through a filter press, consisting of twenty-four chambers, the sediment caught by canvas-covered plates, and the cyanide drained off and returned to the storage tanks. The plates are cleaned up every two weeks and the product forwarded to refiners and smelted. The management intends to increase the capacity to 150 tons daily.

UTAH.

R. H. Aiken will put men to work on the Gold Bug group of claims at Deer Lodge, on which he has a $60,000 bond. Forty men are employed in the Charlie Ross group. The vein is over 100 feet wide. The Inter-Ocean tunnel is being pushed with three eight-hour shifts.

The Robinson group, at Deep Creek, has accumulated large ore quantities awaiting shipping facilities. The assays show from 14 to 57 per cent copper, twenty to eighty ounces silver and $1.80 to $18 gold per ton.

The sulphur beds at Cove will be enlarged and improvements made in the plant. Meyer Bros. & Co. of St. Louis, who own the property, have imported the greater portion of sulphur in their wholesale drug trade from Sicily and Japan, but the Sicilian supply has been curtailed and restrictions placed on Japanese exports owing to the diminishing supply there. These two facts make the Utah supply more valuable, and the owners have determined to lend their energies toward making a new market for the local product.——Green & Co., owners of the Mignon group at Manning, made a strike of free gold ore which yields good results.——Good ore is being taken from the 1300-foot level of the Bullion-Beck at Tintic. Seventy-five tons is being hoisted daily and when the new shaft is completed 125 tons per day will be taken out.——A body of shipping ore has been discovered on the 350-foot level of the Lower Mammoth, assaying 35 per cent lead and forty ounces in silver.——The Four Aces struck an ore body that shows in the first grade sixty-six ounces in silver, two-tenths of an ounce gold and 43.5 per cent lead. A lower grade assays 22.4 ounces in silver, two-tenths of an ounce gold and 9 per cent lead. The vein from which the better ore was taken was discovered at a depth of 630 feet and is 1 foot wide.

The Mammoth mine will soon erect a 50-ton cyanide mill.——Dalton & Lark will resume work on their placer property near Bingham.——The Spanish mine is producing two carloads of forty tons daily of ore averaging 30 to 40 cent. A second ore body was opened in this property, 7 feet wide, carrying 45 per cent lead.——A new ore body was struck in the Julia Dean, from which regular shipments will be made.——A large vein of good grade ore was uncovered in the Hooper mine.——In the Highland Boy the tunnel has been driven 640 feet. Power drills have been installed recently.——The lower tunnel on the Greek group has penetrated 10 feet into the vein, in which seams of good ore several inches wide are exposed.

The water in the Silver King mine, at Provo, has widened to 3 feet. The results of the last assays were $20.90 per ton, and the tailings cyanided yielded 31.3 per cent. The management contemplates putting in a combination cyanide and concentrating mill.

MONTANA.

At the Broadwater mine, Neihart, operations are carried on through three tunnels of 2000 feet each; the ore is sulphide.——The Big Seven mine produces silver-lead ore of high grade. It has been a producer the greater part of the past year.——At the Florence mine the main shaft is 300 feet deep.——At the Galt mine three tunnels have been driven on the vein. The main tunnel is 1800 feet.

The Butte Monitor Tunnel Co. has incorporated, with a capitalization of $300,000.——It is announced at Marysville that the cyanide plant of the Montana M. Co. will start the 10th of this month. The past winter the company has erected two leaching tanks, making four in all, of 400 tons each.

Wallace & Co. at Sterling are extracting good ore.——The Sparrell & Luther mine, near Sterling, has fifty tons of ore ready for shipment.——The Arkansas struck a 10-inch vein of high-grade ore.——The Monitor mine shipped a carload of ore that netted $238 per ton. The Monitor is shipping thirty-six tons a week, though a lower grade.——The Pilot mine at Clancy will be reopened. The G. & B. shipped a carload of ore last week.

The Nellie Darby mine, at Sheridan, is producing ore that runs from 40 to 97 per cent lead, 20 to 38 ounces silver and $3 gold.——The Hawkeye, near Twin Bridges, has a vein 4 feet wide producing $80 per ton in gold, silver and lead.——The Thistle, at Rochester, has reached 240 feet depth; the length of ore chute exposed is 300 feet on the 200 level; the vein is 2 feet wide and runs $70 gold, 5 per cent lead and three ounces silver.

The number of men employed in the mines of Butte is about 5000, divided as follows: Anaconda 1600; Boston & Montana 700; Parrot 400; Montana O. P. Co. 300; Colorado 300; Butte R. Co. 350; Alice Co. 225; all others 1100.

The Boston & Montana has let a contract for the building of a new blast furnace at Great Falls, which will add one-third to capacity of the plant.

SOUTH DAKOTA.

The Holy Terror mine in Pennington county is producing gold bullion from a 10-stamp mill at the rate of $35,000 per month.——At the Golden Crest, at Two Bit, the shaft is down 120 feet. Bunches of ore run $100 to the ton.

The smelter that was destroyed by fire at Deadwood will be rebuilt so soon as the insurance can be adjusted. This announcement is made by Dr. Clark of Lead City, who, together with Swift Bros., owns the property. The insurance on the smelter was $100,000.

WYOMING.

Rock Bros. have bought a three-fourths interest in the Golden Ruby mine at Grand Encampment for $12,000.

G. Nebeker began development of the soda deposits at Green River. He expects to manufacture caustic soda and deliver it at Chicago for $15 per ton, $17 less than the present market value of the product at that place. He has secured 550 acres, which covers all the deposit known to contain carbonate of soda. Plans have been prepared for a plant of twenty-five tons daily capacity. That at Green River is the only known deposit of carbonate of soda in the United States. The liquid carries 10½ per cent of the carbonate.

A new mineral district has been discovered in Uinta county, which extends from a point three miles south of Evanston to the Utah-Wyoming line, and in places is several hundred yards wide. The ore is a decomposed formation.

MICHIGAN.

The Quincy M. Co., at Houghton, will enlarge its stamp mill this season, and also sink shaft on the Mesnard property.

ONTARIO.

At the Olive mine, near Portage, the shaft has reached 160 feet. The vein, though small, mills $45 per ton. The mill treats six tons every twenty-four hours. Another shaft is being sunk, and, when the mine is thoroughly prospected, if occasion warrants, a larger milling plant is to be constructed.

COLORADO.

(Special Correspondence).—A recent discovery in the Golden Age mine of Jamestown, in the 700-foot level, was a small pocket of specimens, the market value of which was $200 per pound. A second lot of twenty-three pounds from the same pocket netted the leasers $50 per pound, while sixty-six ounces of gold was panned out from the fine dirt which accumulated while extracting the specimens. The ore is a black telluride. Besides this, a shipment of two tons of an ordinary grade was made to the sampling works.

In the 900-foot shaft of the Slide mine the vein of sylvanite is from 4 to 10 inches thick.

In the 800-foot level of the Golden Age mine mineral is found, the first-class running from $25 to $30 per pound.

In Wall Street Camp abandoned properties have been cleaned out and put in shape for extensive operations.

The Gold Extension M. & S. Co. owns 110 lode claims in Sugar Loaf district. These will be tapped by the Wall Street tunnel and open good mineral sections. The tunnel is supplied with double track, air compressor and machine drills. The fuel used is distillate, one of the by-products of petroleum, costing less than one-half as much as coal.

Boulder, April 2d, '98.

With the completion of the Colorado & Northwestern Railroad from Boulder to Sunset the expense of freighting the ore from the mines to the sampling works and smelters is reduced over one-half, and the low-grade mines idle for years will be reopened and operated on a paying basis.——In the new mining camp of Wall Street, C. W. Caryl has bonded and located 110 mining claims and located a tunnel site 6000 feet in length. The face of the tunnel will be 1300 feet below surface. Development has begun.

The Little Johnnie at Whitehorn was sold to Wider & Collins for $25,000 and a royalty of 12½ per cent for one year. The 7-foot vein assays $28 in gold.

The gold output of the Cripple Creek district for March is estimated at $1,200,000.——The Arkansas V. S. at Leadville has 600 men on its pay-roll and is receiving 500 tons of ore daily.——Owens & Co. are shipping eighty tons of iron ore per day from the Result mine.

The Silver Peck mine at Telluride, ten stamps, produces a carload of concentrates daily, which net from $2200 to $2600 per car—a monthly output of from $65,000 to $80,000. Between the sixth and seventh levels there is said to be enough ore to last three years at a consumption of forty to forty-five tons daily. While the pay streak is only 5 to 10 inches in width, the ore runs $50 and upward in gold per ton. The force has been kept up to near 100 men. The mine has two miles of working ground opened up.

The Sedalia mine at Leadville is daily shipping sixty tons of gold ore.——The Little Ella is shipping ore that produces half-ounce gold, 30 per cent lead, and twenty ounces silver.——The Battle Mountain district in Eagle county is shipping eight carloads of ore per week.——The Zerlite at Victor shipped a car of ore that ran $30 per ton.——The Gold Sovereign mine at Cripple Creek made a shipment from the Whisper shaft; six tons ran eighteen ounces.——Out of the Silver lease a ten-ton shipment of thirteen-ounce ore has been made.——From the Lovett shaft a twenty-two-ton shipment returned in two grades fifteen tons three ounces and seven tons fourteen ounces. All this has gone out in the past ten days.

The Grand View mine at Rico shipped two carloads of ore, an iron oxide that carries 400 ounces of silver per ton.——Thirteen cars of ore were shipped from Rico last week. The shipments of 1897 as compared to those of the same period in 1896 were 109 cars against 225 to the end of March.——Judge Hallett rendered his decision in the injunction proceedings brought by the Portland Co. and the Creede & Cripple Creek Co. against the Uinta Tunnel Co. Both suits were brought to restrain the tunnel company from driving through claims owned by the plaintiffs. In the Creede & Cripple Creek Co.'s case the application for an injunction was denied, as the tunnel had been driven through the claims before the bill was filed and no property of value was taken.

Returns of two carloads from the Johnstone lease on Bull Hill, sent out in two grades, first-class brought $285 and second grade $70 per ton. The ore chute is from 3 to 4 feet wide and 72 feet long. The output will reach 100 tons per month.——G. Hummer secured a lease on the E. Porter Gold King for eighteen months for $100,000. —The Cecil mine, near Central City, made its first shipment, which is said to have yielded $30 per ton.——Little Champion mine at Idaho Springs is producing both milling and smelting ore.——The Centennial, near Georgetown, opened a 14-inch streak on the 600 level that runs $50 in gold and copper.——The Headright has been reopened and new ore bodies have been found. The shaft has reached 220 feet.

The Denver *Republican* says that one of the effects of the decision rendered by the District Court at Colorado Springs will be to release the injunction restraining the Orphan Belle Co. at Cripple Creek from paying out the dividend of $100,000 it declared several weeks ago. The payment of this sum to the stockholders will leave the company something more than $10,000 in the treasury. The option disposed of nearly all of the holdings of the company, but there is yet coming on the sale of the property to the Dickerman syndicate $125,000, due Feb. 10, 1899, and in addition to this the company received 20 per cent royalty on all ores mined up to the time the final payment is made.

It is stated that the Lillie Co. netted $50,000 from its March output, being the proceeds of 1200 tons of ore.——The Corey City mine at Silver Plume shipped a lot of ore, the first grade running 33 ounces silver and 18 per cent lead; the second ran 108 ounces silver and 9 per cent lead.——The Bismarck sent out fifteen tons that yielded 270 ounces silver per ton.——The Bullion, near Ophir, shipped eleven cars of ore last week.——At Jimtown the Golden Age made a strike that is producing $30,000 a month. The vein, which was a rich producer fifteen years ago, was again found. The mine employs sixty men.——The Rip Van Dam, at depth of 300 feet, found ore that runs $80 per ton.——The Franklin at Boulder produced in the past year $18,000 from 548 tons.

The Geiger mine at Ward has 250 tons of ore ready for shipment. The shaft on the

On May 20th the Johnson-Locke Mercantile Company will dispatch from San Francisco the Steamer "Tillamook" for Dutch Harbor, Nunivak Island and St. Michaels.

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Plateau mine has reached 430 feet and has 2 feet of ore.

NEW MEXICO.

The Queen M. Co. is pushing work on its properties near Coon. The 10-stamp mill is in operation and forty men are employed – Weatherby & Kitt continue work on their group and are meeting with good results.— The Little Finnie Co. has eight men employed repairing shafts and drifts and placing the property in shape. It is said that active operations will be resumed soon.

A. L. Schumaker has cut a vein near Riconada, said to be 100 feet wide, that averages from $3 to $11 gold. J. P. O'Connor of Santa Fe will build a dredge near Clemgilla. He also contemplates putting in electric power for the operation of dry washers. T. J. Mcquiston shipped a carload of ore from the Copper Hill mine at Riconada that returned $15 per ton gold.——At Whitewater the Confidence mine is producing eighty tons of ore per day, operating thirty stamps, and employs seventy men.—— The Copper Zone M. Co. owns fourteen claims near Watrous that has six parallel veins. The property has been opened by cuts and shafts from 50 to 340 feet in depth. The veins run from 20 inches to 4 feet in width and run about 60 per cent copper. Fifteen men have been employed for a year on development work. A concentrator is to be added shortly. C. A. Scheurich of Santa Fe is Sec'y. of the company.

The San Pedro copper mines in south Santa Fe county, which employed 1000 men in 1882, will resume operations shortly.——The Morning Star and Climax mines at LaBelle are producing ore of shipping quality.——Work will be started this month on the Good Hope mine, near Bland. The last cleanup from a ten days' run at the Bland mill returned 100 pounds of retorted bullion.

ARIZONA.

The Six Mile mine near Pearce has sufficient ore on the dumps to supply a mill. Further development will be pushed.——The Black Diamond copper mine has been bonded to Denver men.——At the Middle March copper mines a new ore body has been opened. There are 2000 tons of ore on the dumps averaging 80 per cent.

The Phœnix *Herald* says that the King of Arizona M. Co. contemplates a change in its mill plant.——Shipments of high grade ore are regularly made from the Matchless mine, in Pima district.——A vein of gold and silver ore of good values has been struck in the Aztec district, Graham county.——With 10,000 tons of ore on the dump, the new plant at the C. O. D. mine in Mohave county is turning out fifty tons of concentrates daily.——At the Mohave county's Tennessee mine the main shaft is 200 feet, and the levels are in pay ore. A carload of ore per day is the regular output.

The tailings of the old Harris mill at Harqua Hala, estimated to contain about $30,000, will be worked by the cyanide method. The plant will have a capacity of 100 tons daily.

The Gladstone, near McCabe, is producing good ore.——The New Year, worked under lease, is producing shipping ore.——The McCabe is producing concentrates carrying gold.——Little Jessie's cyanide plant is working with good results.——The Venezia, near Prescott, has been bonded by Tomlinson & Hall. The property has a 50-stamp mill.——The Jessie at Chapparal is operating a cyanide plant on 10,000 tons of tailings, the values extracted being $6.50 per ton. The property comprises seventeen claims. The high-grade ore is said to run from $80 to $250, and the low-grade ore from $5 to $10 per ton.——C. Born discovered a valuable ore body at a depth of 120 feet, near Chapparal.

MEXICO.

The San Jose copper mines at Linares, Tamaulipas, are worked with 300 men the year round. Shipments of copper will be made from these mines to New York this spring. These mines, owned by the N chols Chemical Co. of New York, comprise 4000 acres. H. L. Bridgeman is the Mgr.

The Avino mine of Durango was transferred to the Avino Co., composed of South African and Australian operators. C. B. Flynn of Monterey has been made managing director and will equip the mine with the latest modern machinery.

The Kansas City Con. S. & R. Co. expects to have its new smelter at the Boquillas mines ready for operation this month. It employs 25 Americans and 100 Mexicans.

The Mexican Adventure Co. of El Oro have struck the ledge of the Esperanza.——The Morelos claims were sold for $15,009.——The La Reforma claims will soon be shafted, work already being started.——The owners of La Providencia de Borda started a shaft.——The Santiago M. Co. has struck a ledge 1¼ feet wide which assays thirty ounces of silver and four ounces of gold to the ton.

A large placer discovery is reported from Colonia Pacheco, in western Chihuahua.

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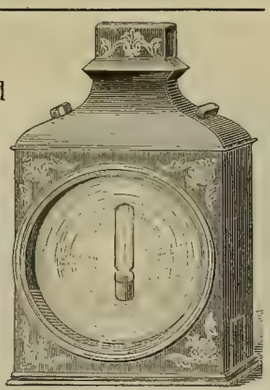
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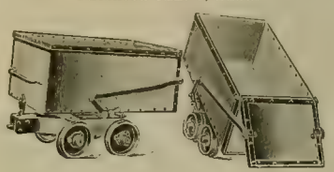
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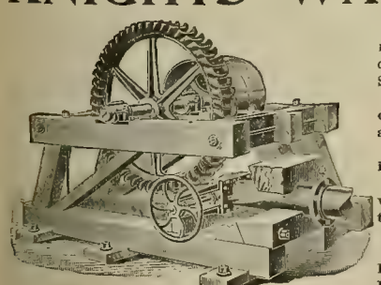
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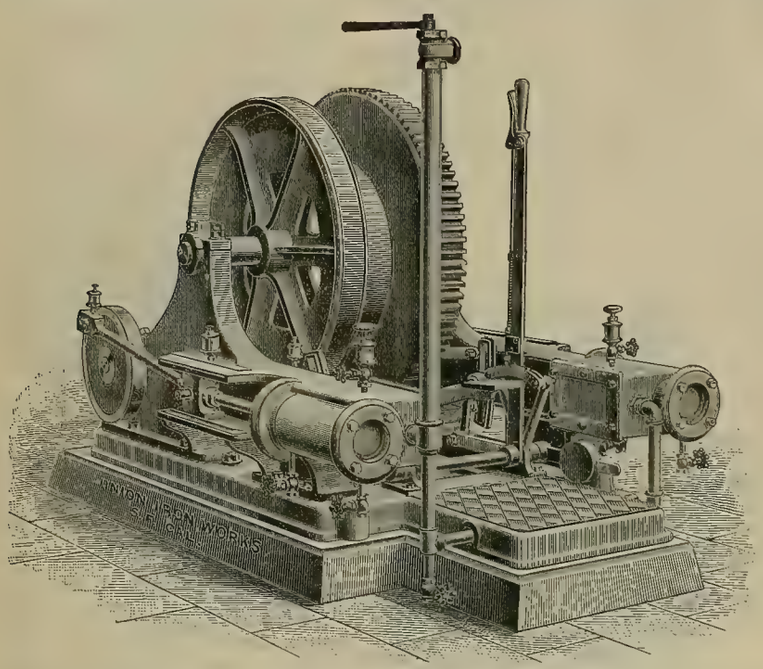
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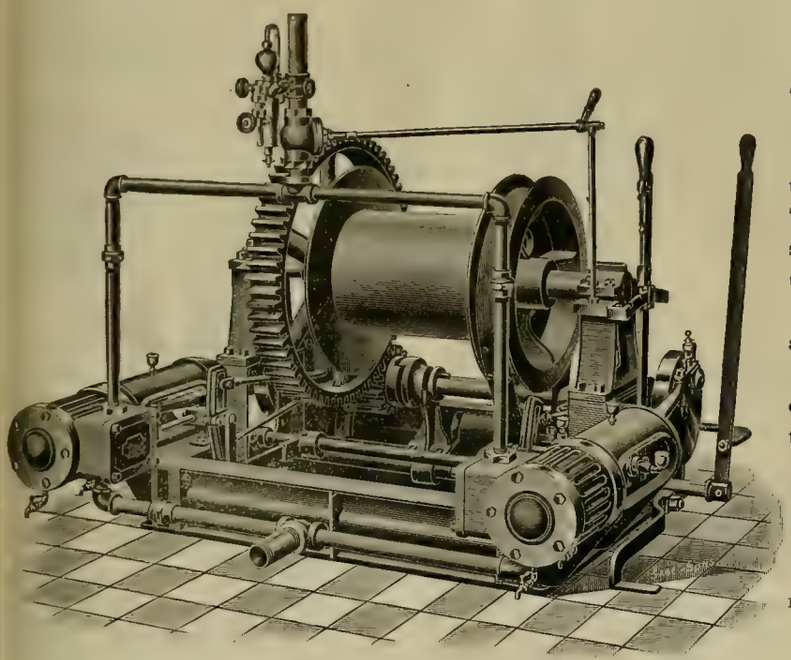
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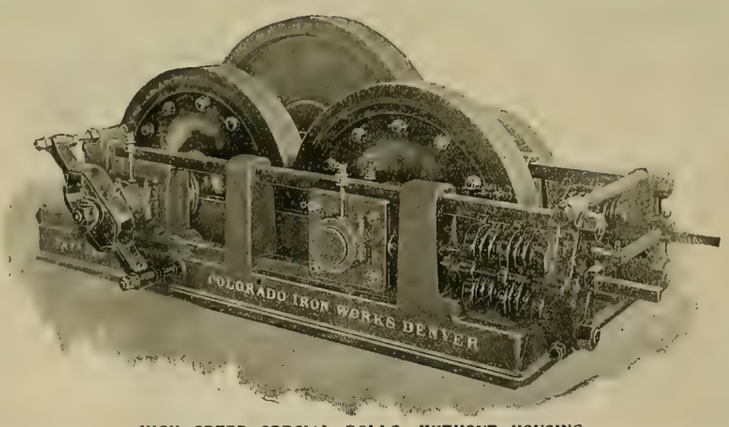
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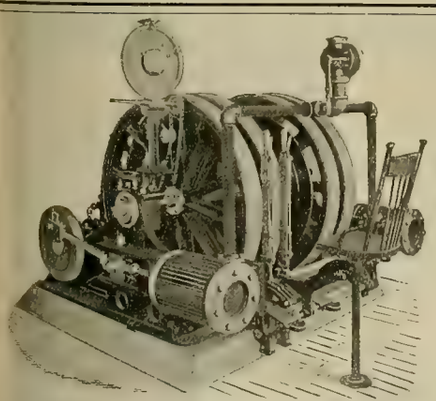
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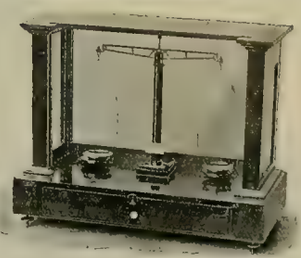
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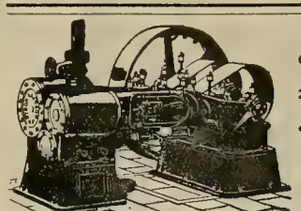
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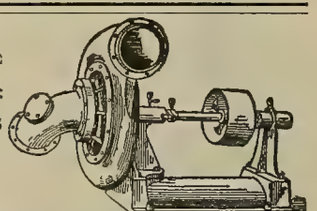
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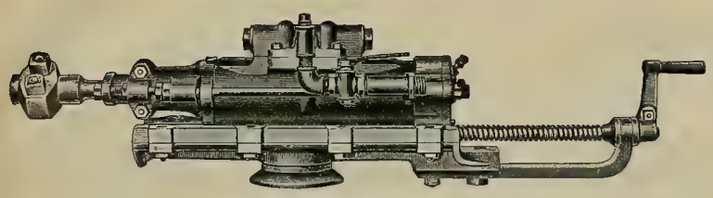


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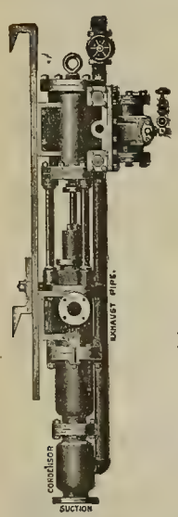
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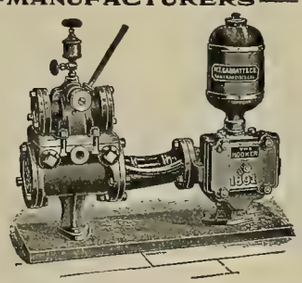
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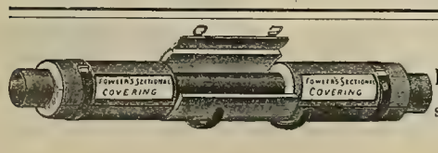






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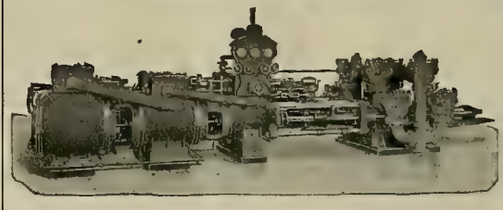
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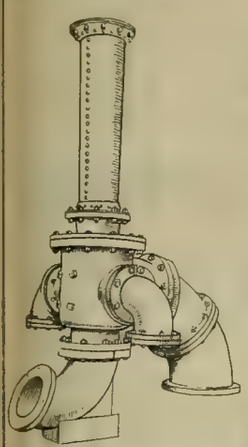
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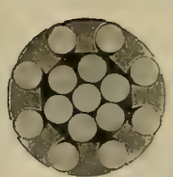
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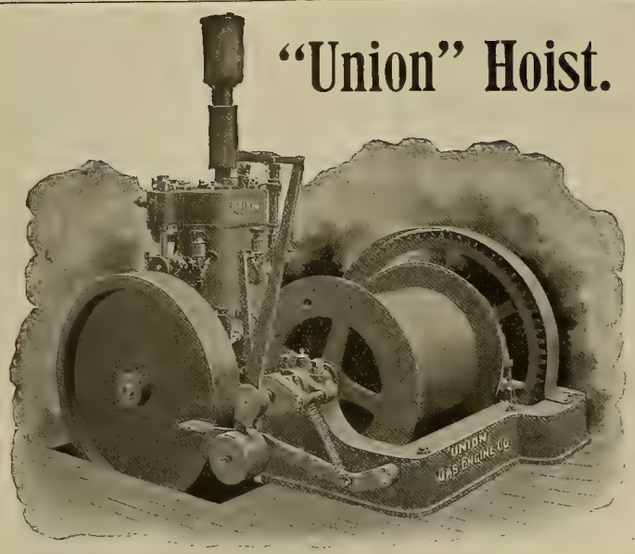
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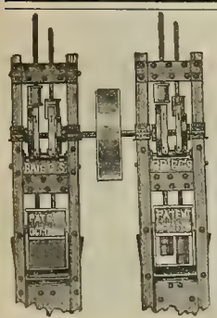
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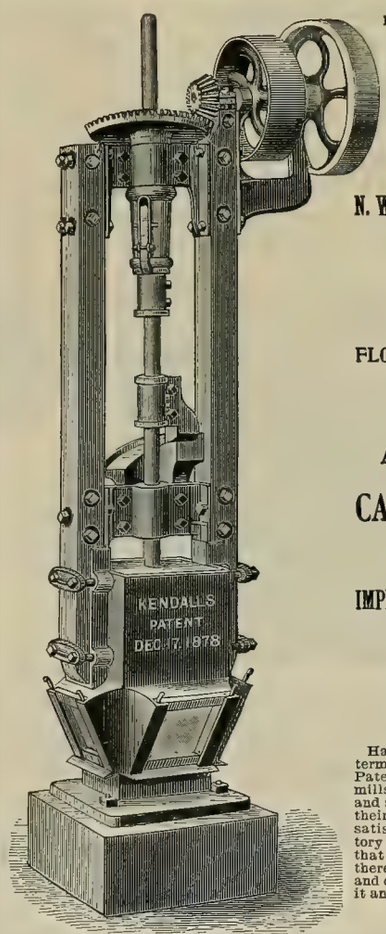
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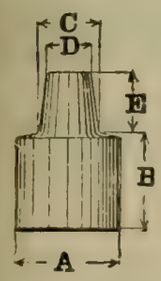
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C=..... "
D=..... "
E=..... "

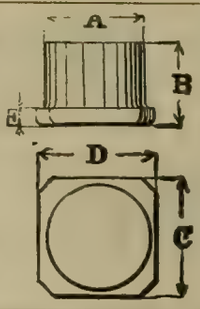
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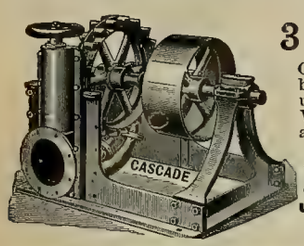
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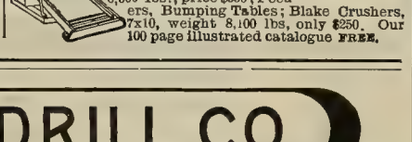
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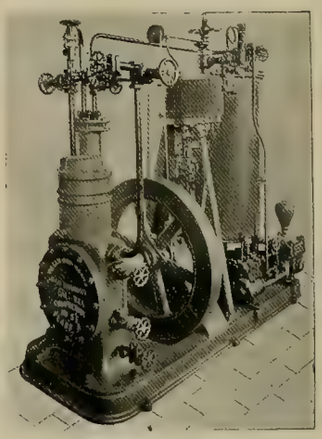
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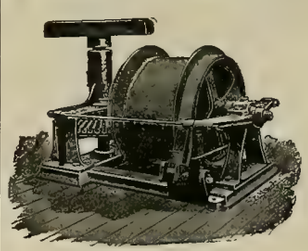
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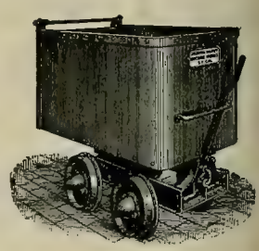
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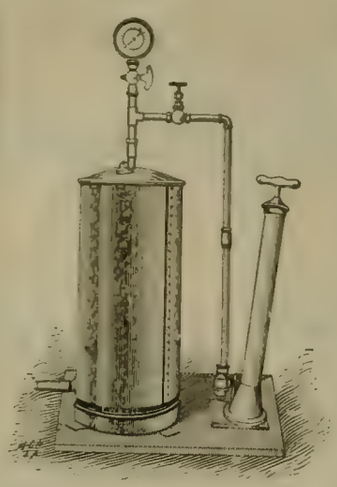
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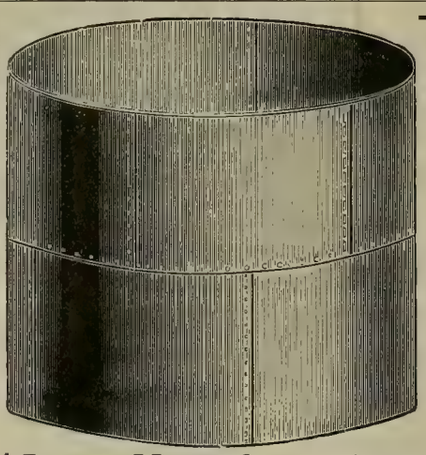
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Market Reports.

The Markets.

SAN FRANCISCO, April 7, 1898.

No material change in staples is reported during the week, a drop in coal being the most noticeable feature. The Alameda, from Australia on the 6th, brought 44 gold bars—$327,375—from Auckland and $2,000,000 in sovereigns from Sydney, making a total of gold imports from Australia of over $16,000,000 in the last six months. Specie exports from San Francisco during January, February and March aggregated $15,466,951, and included $1,058,800 in silver bullion, $621,893 in Mexican dollars, $13,577,696 in gold coin and $21,896 in silver coin. Of this amount $1,395,250 went to China, $320,100 to India, $97,000 to Honolulu and $13,618,000 to New York.

Silver closed in London and New York today at 25⅞ pence and 55¾ cents per ounce, respectively. Refined silver per ounce, 1000 fine, in this city is 56 cents; Mexican dollars, 45½c. Copper, New York price, 11.75@12; local ingot casting, 13½; sheet, 16¾. Pig tin is quoted here at 15. Lead, New York, 3.75; local, pig, 4¾@5. Quicksilver, domestic, $40; export, $37. Chemicals are unchanged.

Mining Share Market.

The market closed drooping last week. During the months of January, February and March sales on the regular calls of the S. & E. Board aggregated 474,685 shares. Prices opened weak on the 4th, but, influenced by the inspection of Sierra Nevada, the north end stocks sold higher. That there is a favorable feeling around is evinced by the fact that at the sale of Potosi for non-payment of the recent assessment there were but 74 shares of the 112,000 delinquent. During the 5th, 6th and 7th there was a little movement at better prices. A Supreme Court decision in the Hale & Norcross suit is daily expected and pointers thereon have depressed the stock. Sierra Nevada, Alta and Occidental are well spoken of. Nothing of importance is to be noted in the official reports during the week.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 7, 1898.

9:30 A. M. SESSION.

200 Best & Belcher...	32	200 Mexican.....	40
600 Con Cal & Va.....	75	20 Ophir.....	75
100 Crown Point.....	24	350 Sierra Nevada....1	85
300 Gould & Curry....	23	100 Union.....	45

SECOND SESSION—2:30 P. M.

200 Ophir.....	80	300 Sierra Nevada....2	10
100 Mexican.....	42	300 Union.....	48
100 Gould & Curry....	26	1000 Alta.....	19
850 Best & Belcher...	32	300 Occidental.....2	90
250 Con Cal & Va.....	80	200 Andes	18
100 Savage.....	23	12½ Standard.....1	60
200 H. & N.....1	25		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage.

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Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated.

Examine mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

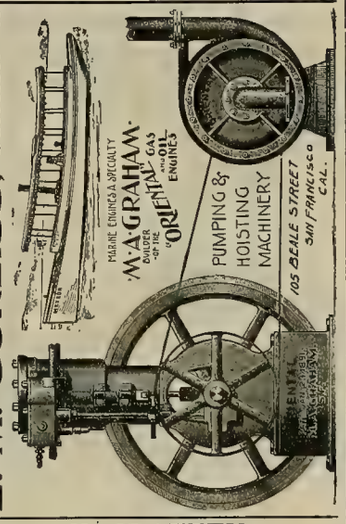
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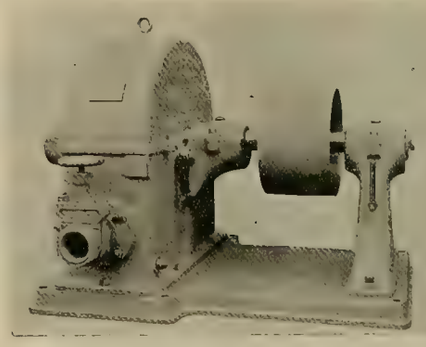
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Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

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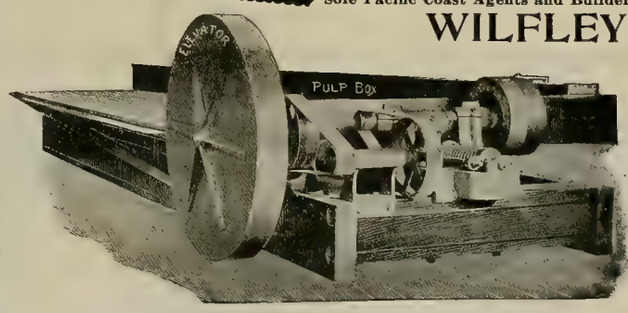
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4. It requires little or no attention when once adjusted and no expert is required to either adjust or run the machine.
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Assessment Notices.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of March, 1898, an assessment (No. 11) of 25 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 59, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of April, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 59, Nevada block, San Francisco, California.

CONSOLIDATED ST. GOTHARD GOLD MINING Company.—Location of principal place of business, 113 Crocker building, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of March, 1898, an assessment (No. 13) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker building, sixth floor, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of April, 1898, will be delinquent and advertised for sale at public auction, and unless payment is made before, will be sold on WEDNESDAY, the 11th day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. F. HOLLING, Secretary.

Office—113 Crocker building, sixth floor, San Francisco, California.

RICHMOND GOLD MINING COMPANY.—Location of principal place of business San Francisco, California; location of works, Butte County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of March, 1898, an assessment (No. 2) of 1 cent per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 406, No. 328 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of April, 1898 will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

L. R. TUTTLE, Secretary.

Office—Room 406, No. 328 Montgomery street, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey county, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the eighth (8th) day of March, 1898, an assessment (No. 64) of twenty cents (20c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twelfth (12th) day of April, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the third (3d) day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada Block, No. 309 Montgomery street, San Francisco, California.

TUBER MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, Panamint district, Inyo County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 22d day of March, 1898, an assessment (No. 1) of fifty (50) cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of May, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on THURSDAY, the 2d day of June, 1898, to pay the delinquent assessment, together with the costs and expenses of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of March, 1898, an assessment (No. 33) of 15 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of April, 1898, shall be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 10th day of May, 1898, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of March, 1898, an assessment (No. 13) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on MONDAY, the 2nd day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of March, 1898, an assessment (No. 45) of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1898, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 28th day of April, 1898, at 11 A. M., to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Room 22, Nevada block, San Francisco, California.

CHURCH GOLD MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, El Dorado, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 23d day of March, 1898, an assessment (No. 1) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary at the office of the company, room 15, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 29th day of April, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 23d day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. P. SWAIN, Acting Secretary.

Office—Room 15, Nevada block, San Francisco, California.

DELINQUENT SALE NOTICE.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 6) levied on the 25th day of February, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Wm. T. Thomas.....	20	157	157 00

And in accordance with law, and an order from the Board of Directors, made on the 25th day of February, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, room 24, 320 Sansome street, San Francisco, California, on TUESDAY, the 26th day of April, 1898, at the hour of 3 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Wm. Nolden and C. Kaber, in the Aureole mine, near Oleta, Amador county, to deposit tailings in Deadman creek, and from George Beattie, in the Beattie mine, at Georgia Slide, El Dorado county, to deposit tailings behind the dam of the Gold Bug mine, in Canyon creek, gives notice that a meeting will be held at room 59, Flood building, on April 11, 1898, at 1:30 P. M.

THE

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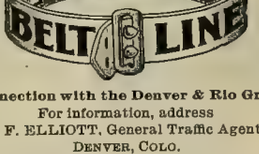
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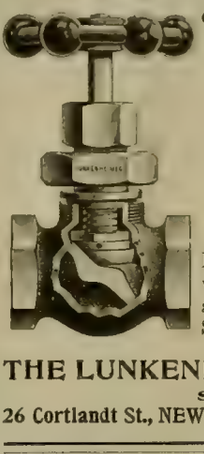
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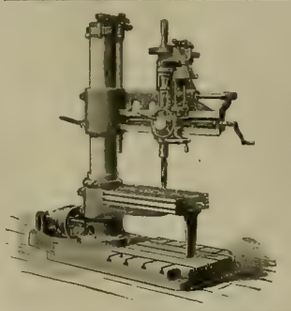
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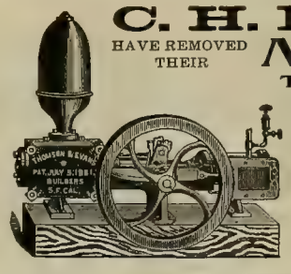
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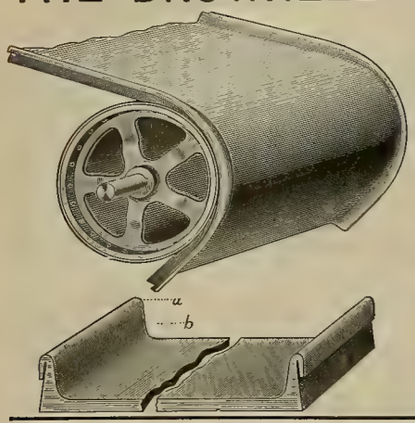
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SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
SUTTER CREEK, AMADOR CO., CAL., Feb 22, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.

Yours truly, JOHN ROSS JR., Superintdenent.

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MR. J. S. BROWNELL, San Francisco, Cal.—DEAR SIR: For some years we have used three different styles of belts on our Frue vanner at the Mexican mill, and for smooth working and endurance the Brownell Patent Lip flange belt has proved its superiority over all others, and I unhesitatingly recommend it to all who are using Frue machines.

Yours truly, EUGENE MAY, Foreman.

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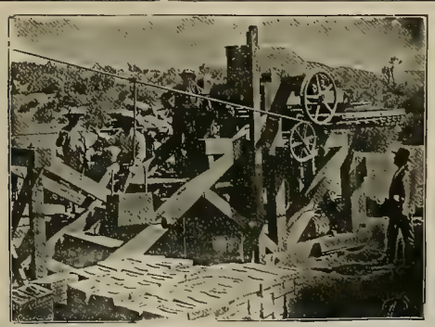
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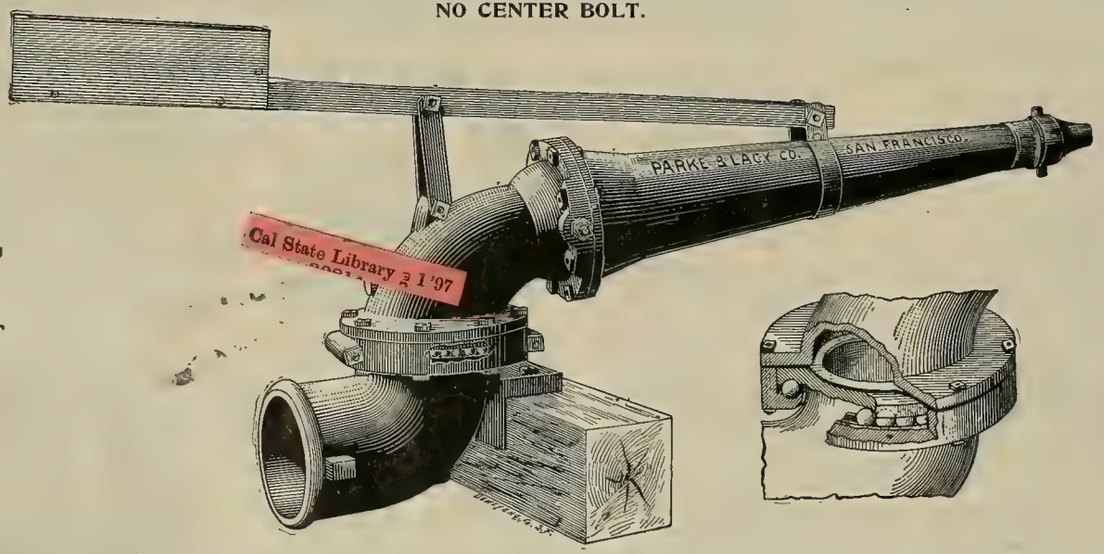
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No. 1971.—VOLUME LXXVI. Number 16. SAN FRANCISCO, SATURDAY, APRIL 16, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A Typical California Gold Mine.

The Dutch mine, illustrated herewith, is a steady producer, on the mother lode, Quartz mountain, Tuolumne county, Cal. It is an old property, located in 1856, and was being worked with varied success in a small way when it passed into the hands of the Dutch Mining and Milling Company, the present owners, a San Francisco corporation, organized under the laws of the State of California October, 1893. Prospecting was pushed until January, 1895, when work on a larger scale began. A shaft was sunk 420 feet, the utmost depth attainable by the machinery then in place, at which time drifts were run on the second, third and fourth levels. A 5-stamp mill was erected in September, 1895, and run until the following April, when a second battery of five stamps was added. In the latter half of 1896 the shaft was straightened and enlarged into a three compartment shaft and hoisting works erected which will enable the company to sink 1500 feet. Some old workings on the north end of the mine were opened out and retimbered, together with the shafts connecting them with the surface, and connected with the new ground the company was opening up. Last June ten more stamps were added, making twenty stamps in all, and sinking started below the 420-foot level, since which time the mine has been running satisfactorily. The present plant consists of a double-drum steam hoist, a 20-stamp mill, ten 4-foot vanners, rock breaker, etc., run by steam power. A Gates canvas plant is in operation, and a ten-drill air compressor is being put in. The main shaft is now 700 feet deep, sinking going on continually. About seventy men are employed.



DUTCH MINE, TUOLUMNE COUNTY, CAL.

During 1897 the mine produced in the neighborhood of $150,000, from which all outstanding debts were paid and $26,000 was paid in dividends, dividends having been paid almost regularly every month since last July. Considering the amount of money necessary to make a mine a dividend payer, the showing made by the Dutch mine is good and such showing is only possible when men of requisite experience are at the head of a company. The management started to sell stock at a figure calculated to bring the mine to a paying basis without the necessity of levying assessments. This has been accomplished so successfully that a large block of stock still remains in the treasury of the company, there being no necessity for its sale. G. Trittenbach is president. From the inception of the company A. Trittenbach has been its superintendent and manager, and the company considers much of its success due to him. B. Healey is vice-pres.; A. W. Livingston, treas.; G. W. Gerhard, sec'y.



RANDSBURG, CAL., MARCH, 1898.



RAND MINES AND BUILDINGS, RANDSBURG, CAL.



GARLOCK, CAL., MILLING POINT FOR RANDSBURG ORES.



VIEW OF RAND MINES, RANDSBURG, CAL.

(See page 416.)

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....General Manager

San Francisco, April 16, 1898.

TWO INTERESTING FACTS.

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Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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UTAH furnishes a good example of profit on low grade ore. In the Geyser-Marion at Mercur the average value of the ore is $3.75 per ton. A $6,000 dividend last week makes a total of $72,000 profit thus paid in the last year. The Mercur Company has paid dividends aggregating almost $1,000,000. At the Mercur mill the average cost of the treatment is 86 cents per ton; at the Geyser-Marion 82 cents.

THE annual report of the Nevada Co., California, narrow gauge railroad is a good showing of efficient management, and incidentally a good argument for what this paper has so long advocated, namely, the mutual profit to foothill and mountain regions of narrow gauge roads. There has been enough money lost to mining interests in the two counties of Amador and Calaveras alone to pay for the construction and maintenance for fifty years of such a road as that running from Colfax to Grass Valley and Nevada City. The little road mentioned, for the year earned $108,592; to operate it cost $85,623.

AT this week's meeting of the Regents of the University of California, the necessity being shown for the expenditure of $12,500 for the erection and equipment of a Mines and Mining Building, Mrs. Phœbe Hearst, one of the regents, made proffer of the amount, which was gratefully accepted. She also made the munificent offer of sufficient amount to secure the building of a larger permanent structure, the $12,500 being but for a temporary building and equipment. It is understood that that liberal lady's gift contemplates the expenditure of $250,000 for the mining department of the University.

DROUGHT on the land and low water in the streams makes this an ideal season in California for river improvement work, but beyond drawing salaries the State officials who have charge of the long deferred dredger proposition seem unable to make any headway. It is the old story of successful effort in and out of the Legislature to secure the needed appropriation, the co-operation of the Federal Congress and the securing of sufficient money to go ahead; and the now long drawn crossfire of opinions, hypotheses, etc., resulting in easy positions at comfortable salaries, but nothing more, and miner and farmer alike chafing at the prevailing impotence. The most recent official report on this subject appears on page 418.

A Ruling of the Court.

Notice was taken herein at the time of the decision of Judge Virden of Mono Co., Cal., against the recent state mining law abrogating mining district recorders. In the issue of the 26th ult. appeared an authoritative answer to the question: "If a miner locates a mine under the mining law of May 26, 1897, and does not do the required $50 worth of assessment work in sixty days, does he forfeit his claim, and is it then open for relocation?" During the week an eminent legal authority of Los Angeles cites the fact that Olin Wellborn, sitting as Circuit Judge in the United States Court at Los Angeles, last week rendered an important opinion, on a cognate subject, in the suit of Northmore vs. Simmons, involving the validity of a mining rule or regulation of the Mojave mining district, which required locators of mining claims to sink a shaft or run a tunnel ten feet within ninety days after the location of claims. It seems that Northmore made a location called the Vivian, but failed to do any work within ninety days, as required by the local rules and regulations of the district. A re-location of the same ground was thereafter made by the defendant Simmons, on the theory that the Northmore location had lapsed and become void by his failure to do the required work. Northmore filed suit in the U. S. Court, claiming that such a local rule or regulation was in conflict with the Federal Statutes, which only required $100 worth of annual assessment work. Judge Wellborn decided against Northmore, and ordered his bill of complaint dismissed. It will be noticed that the local regulation of the Mojave mining district required work to be done *after* location, etc., and such work was no part of the act of location itself. The State law referred to above requires $50 worth of work to be done upon each location within sixty days of the preliminary notice, thus making this work a part of the location itself.

From the foregoing it would appear that Judge Wellborn does not agree with Attorney-General Fitzgerald and a number of mining attorneys, who claim that a State law or a local regulation is void which requires any work to be done upon mining claims other than that demanded in the Federal Statutes. Judge Wellborn is considered an able lawyer; he was for a number of years Congressman from the Dallas, Texas, District, and has been personally interested, more or less, in mines during his ten years' residence in California.

The plaintiff has given notice of appeal to the United States Circuit Court of Appeals.

Rapid-Drop and Slow-Drop Stamps.

In connection with some recent discussion regarding the respective merits of slow-drop and rapid-drop stamp mills in California and Colorado, it is interesting to note that in the latter State the rapid-drop stamps are superseding the slow-drop method. In the Black Hawk district, Colo., where fifteen months ago there were but 25 rapid-drop stamps out of a total of 748, there are now 150 rapid-drop, and in such concerns as the New York mill the 75 slow-drop stamps are now being altered to rapid-drop, thus doubling the capacity. The slow-drop stamp of Gilpin Co. weighs about 525 pounds and drops 19 inches in a low mortar with deep issue, 30 to 40 to the minute. With this mill the plates used are 4½x8 feet. In California the weight of the already heavy rapid-drop stamp has been increased to 1200 and even 1400 pounds, dropping 90 to the minute. What is locally known as "the Colorado method" is giving way to existing conditions and requirements, which call for quicker work and closer saving. Advocates of the old style slow-drop, however, still maintain that Colorado ores give better results with slower motion; that the material must have time to settle or it will either scour off the plates or not come in contact. The obvious answer is that by giving the plates the proper inclination the tendency to scour is largely overcome.

The difference between the California and Colorado ores must be recognized. California gold ore is, generally, harder than that of Colorado, the gold is coarser, and as a rule the ore bodies are larger. In California ore there is, usually, a much smaller proportion of sulphurets than are in Colorado ore. Financial results, which are the standard and touchstone of all metallurgical methods, declare in favor of what in contradistinction has been styled "the California method," which in stamp practice means very heavy, quick-dropping stamps, the Colorado mill being here looked upon as an amalgamating machine.

An Important Ruling.

During the week the California Debris Commission has made an important ruling, or rather definition, regarding hydraulic mining in California. It will be remembered that at the last annual meeting in October, '97, of the California State Miners' Association, Section 8 of the Caminetti law was discussed at considerable length. That section is: "That for the purposes of this act hydraulic mining and mining by the hydraulic process are hereby declared to have the meaning and application given to said terms in said State."

Section 1425 of the Civil Code of California, approved March 24, '93, defining the term "hydraulic mining," says: "Hydraulic mining, within the meaning of this term, is mining by means of the application of water under pressure through a nozzle against a natural bank." This is the definition of hydraulic mining as understood by hydraulic miners in this State. The question came up in the convention and brought into prominence just what was understood to be the definition of hydraulic mining, the point being, Could one throw down a natural bank by explosives and then wash it, or could tailings be so washed? the question raised being the jurisdiction of the Debris Commission.

Under date of the 4th inst., in a communication to J. M. Wright of this city, Lieut. Deakyne, Corps of Engineers, Secretary California Debris Commission, says: "Hydraulic mining is defined by the California Debris Commission to be mining by means of water under pressure through a nozzle."

This is the latest official utterance of the Commission and is important to the hydraulic miners of California. It will be noticed that the matter of "a natural bank" is entirely ignored. The Debris Commission is the judge and interpreter of the law. This announcement covers the question discussed at such length last October.

As to drift mining, under this construction, Can a drift miner work his gravel, depositing it on the dump, and wash out that artificial bank "by water under pressure through a nozzle?" So far as this is concerned, is drift mining recognized by the Commission as hydraulic mining, and is the drift miner subject therefore to be enjoined and required to build dams, etc.?

In the judgment of the framers of the Caminetti act, and of those who secured a definition of what hydraulic mining is in Section 1425 of the Civil Code of California, referred to above, it is not hydraulic mining when water under pressure through a nozzle is operated against a bank of earth or gravel artificially placed. When this matter was being discussed last October, T. L. Ford said:

The operation of hydraulic mining does not consist alone of the propulsion of water against a bank artificially placed; aids are called to the assistance of the water, powder is used, blasting material, explosives, streams of water pouring over the banks, are also used. These agencies are used with the water under pressure; but the thing against which you operate is the gravel or earth as it stands where nature put it; and if you disintegrate it by means of explosives, if you break it down by means of water pouring over it, and then collect the gravel or earth thus obtained in sluices by means of water operated under pressure, you are conducting the business of hydraulic mining; but if you take gravel or earth that has been artificially collected in some place remote from its original locus, if you take the tailings of a mine that have been collected miles away from the place where nature first put them, and if upon these you turn water under pressure, you are not mining by the hydraulic process; you are doing something else—you are working tailings. No more can that be considered hydraulic mining than can the reduction of earth or gravel, taken from a drift mine and collected artificially in one place.

Hydraulic mining had its origin in California. Whatever just definition there is to the term "hydraulic mining" has developed and grown in this State, and all California miners know what is meant by the term "hydraulic mining." Their definition is believed to be incorporated in Section 1425 of the Civil Code of California. The Debris Commission is composed of impartial men who have desired

to make just interpretation of the matter submitted to them by the State Convention last October.

On this subject C. H. Lindley discourses at length in his new work, "Lindley on Mines." Under Section 852, Vol. II, he says:

All parties seem to agree that the application of water under pressure and through a nozzle were essential elements of definition of the terms "hydraulic mining" and "mining by the hydraulic process;" but it has been contended that unless the water is directed against a *natural* bank, one that is a part of the mass of the mountain in a state of nature, the application to it of water under pressure through a nozzle does not constitute hydraulic mining as understood in California. In other words, such application against a bank of material artificially constructed, such as a mine dump or deposit of tailings or loose gravel impounded or caved from its natural position by human agency, is not "hydraulic mining." The California Anti-Debris Association, representing the farming interests, contend that the term is, and always has been, sufficiently comprehensive to embrace the application of water under pressure through a nozzle to any kind of a bank or body of material, natural or artificial, where the object sought was to liberate and secure the gold. The lexicographers afford us but little aid in determining the local signification of phrases. The definition given in the Standard Dictionary is as follows:

HYDRAULIC MINING. A method of mining, in which a bank of gold-bearing earth or gravel is washed away by a powerful jet of water and carried into sluices, where the gold separates from the earth by its specific gravity.

Dr. Henry De Groot, a writer of prominence on subjects connected with California, in his contribution to the Britannica on the industrial history of that State says:

Hydraulic mining consists in the plan of breaking down and disintegrating the banks of auriferous gravel as they stand in place, by means of water discharged against the same in large quantity and under great pressure.

Lieut.-Col. G. H. Mendell, of the engineer corps, in his report made pursuant to the provisions of the river and harbor act of 1880, upon a project to protect the navigable rivers of California from the effects of hydraulic mining, gave the following definition:

Hydraulic mining, as it is understood in California, is that process by which a natural bank is excavated by a jet of water and conveyed by the same water through the sluices to the dumps. Water does all the work; manual labor is needless to a perfect bank. When boulders are found too large to pass through the sluice, they are sometimes blasted into smaller pieces. Where the bank is cemented or contains masses of pipe clay, it is shattered by charges of powder.

Hon. John S. Hittell, the most noted of writers on the subject of California history, thus describes the process:

Hydraulic mining is that mining where a stream of water, led down from a considerable elevation through a hose, is thrown by the pressure with great force upon the dirt which is thus loosened, dissolved, and washed down into the sluice. * * * Hydraulic mining is not a process of washing dirt, but of preparing it for washing.

Mr. Aug. J. Bowie Jr., a well known mining engineer, in his contribution to the American Institute of Mining Engineers, on the subject of hydraulic mining in California, says:

Hydraulic mining may be defined as the act of extracting gold from gold-bearing detritus, i. e., surface deposits, placers or washings by means of water under great pressure, through pipes against the auriferous material.

And, in his "Practical Treatise on Hydraulic Mining in California," he defines it as "that method of gold mining in which the ground is excavated by means of water discharged against it under pressure (hydraulicking)."

Dr. R. W. Raymond, in his "Glossary of Mining Terms," contributes the following:

Hydraulicking. (Pac.) Washing down a bank of earth or gravel by the use of pipes conveying water under high pressure."

Prof. J. Ross Browne, in his report to the Secretary of the Treasury upon the mineral resources of the West, tells us that the process was invented in 1852, and describes it as one "in which a stream of water was directed under heavy pressure against a bank or hillside containing placer gold, and the earth was torn down by the fluid and carried into the sluice to be washed."

When we search for judicial definitions we are practically limited to the debris cases.

Judge Sawyer, in Woodruff v. North Bloomfield G. M. Co., gives the following:

Hydraulic mining, as used in this opinion, is the process by which a bank of gold-bearing earth and rock is excavated by a jet of water, discharged through a converging nozzle of a pipe, under great pressure, the earth and debris being carried away by the same water through sluices and discharged on lower levels into the natural streams and water courses below. Where the gravel or other material of the bank is cemented, or where the bank is composed of masses of pipe clay, it is shattered by blasting with powder, sometimes from fifteen to twenty tons of powder being used to break up a bank.

In the case of United States v. North Bloomfield Gravel Mining Co., involving the constitutionality of the congressional act, the Government alleged that:

Hydraulic mining as now, and for twenty years last past, practiced and understood in the State of California, is a process of gold mining by which the hills, ridges, banks and other forms of deposits of earth which contain gold, are mined and removed from their position by means of large streams of water, which, by great pressure, are forced through pipes terminating in nozzles kown as "monitors" or "little giants"; that the water is discharged from such nozzles with great force, by a water pressure of from 50 to 400 feet per second, against and upon the hills, ridges and banks, and other deposits, which are usually shattered or broken up by means of blasts of powder, and softened by running water over and along such broken banks of earth, and undermined by streams of water flowing at the foot of such banks, thus caving down and washing off portions thereof before water is discharged from the nozzles against them.

Judge Ross expressed the opinion that this allegation sufficiently set forth the meaning of the terms "hydraulic mining" and "mining by hydraulic process" as these terms were used in the congressional law.

There can be no question but that in all of the debris cases the process under consideration involved to some degree the use of artificial methods to loosen the soil, such as blasting, undermining with a stream of water and causing natural banks to cave, before the water under pressure was applied. It was a part of the process and a material aid to rapid and efficient work. It cannot plausibly be maintained that when the "little giants" and "monitors" were directed against the mass of material thus torn from the hill by blasting or caving, the miner was not engaged in "hydraulicking," and yet his efforts were not immediately directed against a *natural* bank.

The use of the term "natural bank" in the definitions given must be considered in connection with the context. We think the fair deduction from all the definitions is this: The essential feature which distinguishes hydraulic mining from other classes of mining is the substitution of the power of water, under pressure, applied through a nozzle, for manual labor, in moving material into the sluices, whence, if not impounded, it is carried into the running streams. Whether this application is made against a bank in its perfectly natural state, or against one artificially created is, in our judgment, immaterial.

If a miner turns his monitor against a mass of impounded earth, rocks and tailings, brought down by the streams from a higher operator, would anyone familiar with "mining by hydraulic process" say that he was not "hydraulicing?" If he was not "hydraulicing" how would his method of operating be characterized in the mining vernacular?

Whether or not a miner conducting mining operations within the district defined by the congressional act is within the purview of the act, and subject to the jurisdiction of the commission, will depend not upon the fact that he is or is not contributing to injuries to the navigable streams, but the inquiry is simply, "Is he utilizing water under pressure, through a nozzle, directed against a bank or mass of earth for the purpose of extracting gold therefrom?" Whether the bank or mass was brought to its present abiding place by the carrying power of water during remote geological ages, or is the result of recent utilization of such carrying power by human agency operating on a higher level is, in our judgment, of no legal significance. It is fair to assume that the feature of the great industry of hydraulic mining in California rests in a liberal administration and interpretation of the existing law, or some law framed upon the same general lines. Insistence upon narrow rules of interpretation, which do violence to the spirit of the law, will impede rather than advance the interests of the industry.

THE recent proffer of the Union Iron Works of San Francisco to the Government to erect and maintain a gun factory here is in line with manifest requirements, and practically would give the United States all the facilities of a government factory without the cost of creating or keeping it up. The Union Iron Works has finely demonstrated what can be done in the way of building battleships here. It is a shame, that in the present crisis, the nation has to expend so considerable a proportion of the $50,000,000 appropriated in buying fighting ships abroad. There are idle men enough on this coast to build ships fit as foreign vessels for national defence. Two ships recently bought in England cost $7,000,000. The principal element of cost in such fighting machines is labor. That $7,000,000 would have employed 9000 men for one year at $2.50 per day, and the money would be circulated here instead of sent solidly away. With proper encouragement, that is, definite assurance of work at going prices, battleships built here in San Francisco could be equipped fully armored and fully armed, the complete whole a local product and a creditable one.

IN the issue of the 2nd inst., in answer to a Lillooet, B. C., correspondent who asked at what rate per ton gold is absorbed by new copper plates, recent experiments at the Simmer & Jack, South Africa, mine were referred to. A mistake was made in giving as the result of such experiment a probable absorption of "half an ounce" to the ton of ore milled. It should have read half a pennyweight.

Profitable Deep Mining in California.

Deep mining on the California gold belt makes a satisfactory showing, encouraging in the fact that values increase as depth is attained. In Calaveras county the Gwin mine, now down 1500 feet, only low-grade ore was encountered for the first 400 feet; but between the 400 and 900-foot level $10 ore was produced. Over $2,000,000 was paid in dividends when work was abandoned on the mine by reason of extensive caves many years ago, and since its reopening, at an expense of a quarter of a million dollars, it is again a famous producer. The Kennedy mine, now the deepest in the State, 2400 feet, in Jackson, Amador county, was sunk and worked to a depth of 600 feet of low-grade ore and then shut down, because at that time appliances could not be found to make ore of that grade pay. Upon being reopened ore was found on the 900-foot level that averaged $15 per ton. Since its reopening it has paid over $2,000,000 in dividends and is valued to-day up in the millions. In the same county with the Kennedy may be mentioned the Keystone, 1400 feet; the Mahoney, 1000 feet; the Eureka, 1200 feet; the Wildman, 1400 feet; the Zeila, 1100 feet. In Calaveras county, beside the Gwin, may be mentioned the Utica, world famous as a gold producer and great dividend payer, down over 1300 feet; the Melones, 1000; the Lane & Tulloch, 1350. In Nevada county the Providence, 1700; Omaha, 1700; North Star, 2100; the Idaho-Maryland, 3100 (on the incline); the Empire, 2400; the Champion, 2100. These mines have records of millions, and still, as stated, are productive of greater values at greater depth, indicative of what pushing to deeper levels will attain.

In this regard it is worthy of note as to the difference of opinion among mining men, whether pay rock may be expected before depth is attained. It is held by some that unless at a depth where surface influences cease gold is found in paying quantities, it is not of much use to expect good ore at greater depth, though results do not carry out this argument. Every pay ledge has barren places in it. Rarely, if ever, is gold found distributed evenly through a quartz vein, and it is not reasonable to assume that only ore carrying gold in paying quantities is to be found in the outcroppings. In the natural forces which created the mountains, it is reasonable to assume that both pay ore and barren quartz were alike upheaved; and because the outcroppings are rich it does not follow that a rich mine exists underneath, nor where the outcroppings are light does it follow that paying ore may not be found underneath. In the first history of the Kennedy, the Eureka, the Keystone and several large gold producers of this State, good ore was found near the surface, and better still below. The argument throughout is that it pays to sink deep on "the mother lode." Take one more case, that of the Eureka, Sutter Creek, Amador county, Cal.: the first 400 feet gave $2 50 per ton; subsequently, as depth was attained, that great property gave an output of over $15,000,000.

A Case in Point.

The following letter is a private one received this week, not intended for publication, but is printed here as a sample of similar letters constantly being received at this office. It sometimes happens in cases of this kind that the miner is placed in communication with men having money and judgment enough to take hold of such a thing as a good business proposition:

————, Cal., April 12th, '98.

* * * * * You always seem so willing to help the miners, that I turn to you before any one else. I want money to help develop a good mine. There has been about $10,000 expended on this property and a stamp mill erected. We have stamped out about $1000 in gold, but will have to run a tunnel about 500 feet before we can get ore and water out and work it to advantage. We now have to sack all the ore, draw it up an incline by hand, car it to a chute, shoot it down to another car, and car to wagon. I do not think there is a better proposition in California. The ore assays from $10 to $150 per ton.

The above letter is printed as an illustration of what this paper constantly maintains: that there is more likelihood of profit in taking up such a proposition as the above than in 99 out of 100 Alaska or Klondike or other far-off hazards. There are a good many California miners in precisely the same situation as the writer of the above letter—men who have put all the money they could get hold of into honest and intelligent development work, and who want some more to make a good mine. Such men, coupled with others furnishing the needed capital, make a strong combination. Meanwhile the man who is situated as is the writer of the above letter has the strength of the game; he is bound to win, and can get along without the capitalist—slowly, 'tis true, but is independent. 'Twould be better if such a man could get requisite capital, for operations could be conducted on a larger and more profitable scale, machinery bought, more money produced and spent, with more resultant profit. The letter is typical of a state of affairs in California mining that can only be bettered or solved by a full realization of the profit of investment in such local mining properties.

Randsburg, Cal., Mines.*

The ores of the Randsburg district are generally siliceous. The vein matter is an oxidized quartz, a small percentage of sulphurets. As depth is attained on the various properties, there are indications of the ores becoming more refractory. The depth of the various workings ranges from 125 to 400 feet, and it is estimated that the water level may not be reached inside of 1000 feet, and it is not likely that the free-milling character of the ore will materially change above that level. The speculative and town-building period has passed, and the business of the district is becoming one of mine development and ore production.

The properties of the district have received very little outside financial help, and it may be generally stated that they have paid their own way, so far as developments and improvements are concerned. As a consequence, progress has been slow, but the showing made, so far as development goes, has been encouraging.

The water supply for the town and the mines is hauled several miles in wagons, though a pipe-line is being put in to convey it, which is completed as far as Johannesburg, two miles from Randsburg. The principal milling facilities are at Garlock, twelve miles northwesterly from Randsburg, where an abundance of water is obtained from wells. There is a 10-stamp mill at Johannesburg and one of two stamps at Randsburg, both in operation. The two mentioned are run by gasoline engines. At Garlock there are four 10-stamp mills, one of two stamps and one Huntington. Three of these 10-stamp mills are operated by steam, brush from the desert being hauled in, like huge loads of hay, for fuel. As an indication of what the three principal mills are doing, it may be stated that within fifteen days in March they milled 650 tons of ore, cleaning up therefrom an average of $33 per ton. Besides, a small cyanide plant is operating at Garlock on mill tailings, by which a saving of from $5 to $8 per ton is made.

The Rand group, at Randsburg, now owned by the Yellow Aster Mining Company, is developed by three vertical shafts, four tunnels and about 3000 feet of drifting. One tunnel, which crosscuts the formation, cuts through seven distinct ledges of ore with 200 feet. A system of tunnels, one above the other, will be connected. A deeper shaft is to be sunk on the lower portion of the property, from which drifts on the veins will be made at much greater depth than the present workings. The deepest shaft at present is about 200 feet, but the bulk of the ore has come from the system of tunnels which cut into the side of the mountain above the shafts. This property milled 1620 tons of ore in February, from which the mint receipts showed a return of $35,234. For the first eighteen days of March the same property milled 800 tons, realizing therefrom $26,320. The February output averaged $23 per ton, and the output for the first eighteen days of March, which came from deeper workings, averaged $33 per ton. The company estimates that not to exceed $5 per ton of values are left in the mill tailings. However, the building of a cyanide plant is contemplated, to work the tailings of this ore. In this property the vein walls are not always distinct, much of the gangue rock appearing to be mineralized to some extent, as well as the high grade pay streak. In all the specimens noticed, which panned out readily, it is observed that the free gold is very coarse. The Rand group has produced $135,000 since Dec. 1, 1897, and about $200,000 all told. An unusual thing about this property is that it is being developed into a big mine by the original locators of the claims.

The Napoleon mine, in the Stringer district, about two miles from Randsburg, is being developed from six different shafts, varying in depth from 75 to 160 feet. Incidental to development, about twenty-five tons of ore per month is being milled. The shafts all go down on veins. A singular thing here is that the numerous leads, or stringers, all cut the formation at right angles, instead of following it longitudinally. Within 300 or 400 feet as many as fifty "stringers" of ore have been found. Conditions in this property are duplicated in nearly all the others. The Eureka mill ran twenty-three and a half tons of Napoleon ore which yielded $3500. Tailings from this mill cyanided only $2.20 per ton; hence it is assumed the mill saving was very close and the gold in the ore very free.

The Merced mine, in the Stringer district, has three or four claims, on one of which is a shaft 160 feet deep, with some drifting. J. W. Scott, manager, states that 382 tons of ore have been milled the past year and that bullion of the value of $14,532 resulted.

Adjoining the Merced is the Winnie, whose shaft is 150 feet deep. It belongs to Chas. Cohen, owner of the Kane Springs stamp mill, and is said to have produced about $25,000 in all.

The G. B. mine, nearer town, is owned by McCormick, Powers & McComb. They are developing from a shaft 200 feet deep, and have 500 feet of drifting. I am informed that 1000 tons of ore have been shipped which ran from $20 to $30 per ton. In this property there are stringers of sulphide ores which are better adapted to concentration.

The Little Butte group, located on the outskirts of Randsburg, is equipped with a gasoline hoist, over a 400-foot incline shaft, from which 300 feet of drifts are run. It is stated that the ore from this property has run from $50 to $75 per ton. The values run in comparatively narrow pay streaks.

The Wedge, which joins the Little Butte and Kinyon, has five levels from a 400-foot shaft, which goes down on the vein, on which there is some local faulting. The rich ore is in the pay streak near hanging wall. Ninety tons of Wedge ore averaged $140 per ton. In this vein the pay ore is as narrow as 2 inches and widens out in places to 2 feet. The Wedge and Little Butte mill their ore at the Johannesburg mill.

The Kinyon shaft is 260 feet deep and drifts therefrom extend 175 feet. The management say they ship 220 sacks of ore per month.

The mill belonging to the Johannesburg Reduction Works has ten stamps, treats twenty-five tons per day and uses a gasoline engine.

The Rand-Kern Company contemplate putting in an electric power plant on the Kern river, thirty-six miles west of Randsburg, and transmit power to the district for the use of the mines and mills, a majority of the owners having agreed to utilize a certain amount of power. This enterprise is being promoted by J. W. Eddy of Los Angeles.

At present thirteen gasoline engines are in use in the Randsburg district. It is readily seen that they are well adapted to use in the desert mines, where fuel and water are not easily nor cheaply obtained, and, as operators become more accustomed to them, some of the annoyances incident to running them will disappear.

A milling, concentration and cyanide plant is to be built at Barstow, with special reference to adaptability to the ores at Randsburg, Radamacher and Panamint country. The projectors of this enterprise are those who own and operate the Randsburg railroad between Kramer and Johannesburg, and their plan is to become ore buyers and create a market for any ores running as high as $8 per ton.

In the Mesquite range, at the foot of which Garlock is situated, there are several partially developed properties, whose ores are refractory but well suited to concentration. The reduction plant proposed for Barstow should greatly aid in this development.

Mineral paint, said to exist in extensive veins near Johannesburg, has been used in painting several buildings there. C. H. Stagg is developing this enterprise.

WASCOTT.

Randsburg, Cal., April 4th, '98.

*See illustrations, page 413.

THE practical prospector is rapidly taking the place of the ignorant and the inexperienced. He has paid for his knowledge, not by years in the management of paying properties, but by years of loss mixed up with his gains, to indelibly impress his experience upon the mental faculties. It is a business to which few are adapted, and fewer still are successful. There is nothing in the business world that requires such a wide range of knowledge as that of mining and prospecting. The practical prospector of to-day understands every detail of the solfataric, dynamic and chemical factors most effective in the world's past periods of universal formation. He has learned that while heat, water and vapors have produced deposits in veins and otherwise, many of which have proven valuable, that the greater part of the great bonanzas of the world are always in connection with two of the six principal divisions of igneous or eruptive rocks—trachyte and felsyte—the former generally lying in great fields and truncated masses, the latter in dikes and in overflows and older formations. These again have been divided into various characteristics, owing to the period of eruption or subsequent metamorphism, all of which have been instrumental in mineralizing the adjoining country rocks in veins and deposits. The secrets of the success of the modern prospector and mine manager lie in his knowledge of the dates and effects of the porphyry overflows and intrusions. The advance from prehistoric mining was slow, but is now coeval with all other industries and scientific attainments.

SINCE 1873 Missouri's zinc mines have produced ore which sold for $33,500,000, and during the same time the lead mined brought $17,000,000, a total of $50,500,000. The expansion of the business may be judged from the fact the output this year is estimated at 230,395,192 pounds of zinc and 35,650,940 pounds of lead, giving a total value of $3,181,464. Zinc enters into manufactures, such as roofing, galvanized iron, water tanks, plates for engraving and many articles of art. The British zinc mines yield less than one-sixth of the present zinc output of Missouri, and the gap is constantly widening in our favor. England is compelled to import 75,000 tons of zinc annually to meet the factory demand. Scarcely a year passes in which some new application of the metal is not devised. On April 2 at Joplin, Mo., zinc ore sold at $26.50 per ton, an advance of $5.50 per ton in one year.

"GOLD DUST, How to Find It and How to Mine It," is the title of a pamphlet issued by P. Minor, Seattle, Wash., which costs but 25 cents, and has practical pointers on prospecting and mining.

Treatment of Slimes.

NUMBER II.

The Solution of the Gold.—The dissolving of the gold in fresh slimes is a comparatively simple matter in comparison with the dissolving of the gold in accumulated slimes. In fresh slimes there are usually very few reducing or oxygen-consuming compounds, while in accumulated slimes we may have various substances which will absorb oxygen; and, if we wish the cyanide gold-dissolving solution to act, oxygen must be present. In old slimes, decomposing organic matter, arising from different sources, as well as the various products of the decomposition of pyrites, are always present; all these substances have in common the property of absorbing oxygen in a more or less degree. Therefore, during the operation of dissolving the gold in old slimes, oxygen must constantly be supplied. In the solution of the gold in fresh slimes, also, more perfect and rapid results are obtained when a constant supply of oxygen is secured. At the Robinson works we put the fresh slimes into agitating vats, 20 feet in diameter, filled with paddles, revolving about eight or ten times a minute. The agitation of the slimes by means of stirrers and fixed wings attached to the sides of the vats produced an ever-changing surface which absorbed oxygen from the atmosphere, and after six to twelve hours of such agitation, a fairly perfect solution of the gold in the fresh slimes was obtained. But this same operation, applied to accumulated slimes, did not dissolve the gold, and, in fact, a very lengthened agitation of forty-eight hours failed to do so. In an experimental way, dealing with a few pounds of accumulated slimes, but little difficulty was experienced in dissolving the gold by agitation, because, where you have a comparatively small amount of material to deal with, there is a relatively large surface exposed during the treatment. Whether the agitation is done in a bottle (which is opened from time to time) or in a small vat, the surface exposed for the absorption of oxygen is relatively large, and, as a rule, when working in a small way, the difficulties of dissolving gold from accumulated slimes without the addition of oxygen, other than that obtained from surface aeration, are not experienced. One important point in the solution of the gold was not really understood until we had been working on a large scale for a long time, that is, the concentration of the slime in the liquid, or in other words, the thickness of the pulp. A ton of liquor which is agitated with half a ton of slimes forms a very smooth, viscous pulp, in which, if you suspend a can of cyanide (which dissolves readily in water) the lumps of cyanide remain for several hours undissolved. In other words, the thick pulp will not readily dissolve even so soluble a substance as cyanide; while if you thin the pulp to four or five tons of liquid to one ton of slimes, soluble substances will dissolve very rapidly. In the same way oxygen is absorbed from the atmosphere much more readily by dilute pulp than by thick pulp, and we have found in actual practice that the gold in a thin pulp dissolves more readily than in thick. The general practice is to have about four tons of liquid to one ton of slimes for dissolving purposes, and beyond this point the thicker the pulp the longer the time for the complete solution of the gold.

The principle of oxidation of the reducing substances in slimes by means of aeration was put into practical use by W. A. Caldecott, who, in a paper read before you, has given the reasons that render this operation specially necessary in the treatment of accumulated or acid slimes. This operation was first carried out at the Robinson slimes plant by the introduction of atmospheric air through a perforated pipe in the bottom of the vat containing the charge of pulp undergoing agitation. After preliminary oxidation of the pulp had taken place, in order to lessen cyanide consumption, cyanide was added and aeration continued. It was found that the gold dissolved as readily by this method as in the case of fresh slimes.

The method adopted by Mr. Williams at the Crown Reef for dissolving the gold in fresh slimes was to transfer the pulp from one vat to another by means of a centrifugal pump. In the passage of the pulp through the pump and pipe more or less air is drawn in through pump and pipe joints and glands, and a certain amount of oxygen is absorbed by the pulp whilst the same is undergoing the most perfect agitation, i. e., in its passage through the centrifugal pump and afterwards through the pipes; when the stream from the outlet of the pipe falls upon the surface of the pulp remaining in the vat, a large amount of air is likewise entangled and carried below the surface by the falling stream, thus causing a very perfect aeration to take place. I must confess that I did not until very lately appreciate the efficiency of this operation for dissolving gold. The pulp is simply pumped from one tank to another through a centrifugal pump. Now, at first sight, this appears a simple operation, and, unless one fully realizes the actual condition under which it is carried out, and the chemical reactions involved in dissolving the gold in the pulp, one cannot appreciate its full significance. It was only after the aeration of the slime-pulp at the Robinson and Central works had been carried on for some time that I fully under-

stood and appreciated the operation. Mr. Durant suggested that possibly sufficient air could be introduced into the suction of a centrifugal pump by a proper regulating system of valves for the air and pulp, so that aeration, not only of fresh slimes, but also of accumulated slimes, could be carried out. Although aware of the very low efficiency we were obtaining, owing to shallow vats and other reasons, from the enormous amount of air delivered from air-compressors, I still doubted whether proper aeration could be carried out through the agency of a centrifugal pump. However, a series of experiments in connection with the introduction of air in the suction of the centrifugal pump were undertaken, and these experiments have, I am happy to say, resulted in complete success. We have now by this means been enabled to considerably reduce the time required to obtain solution of the gold, and we have also secured a reduction in the amount of power that is required for the operation. I hope that Mr. Durant will, in the near future, present you with a paper on this subject.

At present there are in operation upon these fields three methods for the dissolving of gold. One, carried out by Mr. Williams at the Crown Reef, consists of pumping the fresh slimes from one tank to another through a centrifugal pump; the second method is used at the Geldenhuis Estate, where the fresh slimes are simply agitated in a dissolving vat, by means of stirring gear, for six or eight hours; the third method, which is carried out at the Simmer and Jack, the Treasury, and the Main Reef, consists in a joint use of both the former methods—that is to say, agitation and pumping through a centrifugal pump. At the Bonanza, agitation, aeration with an air compressor through a pipe placed near the bottom of the vat, and circulation through a centrifugal pump, are all in use at the same time. At the various deep level plants erected by Mr. Williams agitators are used (in several cases) on half the plant only, and on the other half pumping from one vat to another only is employed. In these cases, as at the Main Reef, both systems are being tried at the same works to ascertain which is the more economical. At our Central plant we have adopted agitation and pumping by means of Mr. Durant's agitation process or suction through the centrifugal pump. This is working on accumulated slimes and giving very satisfactory results. At the Robinson plant we have also proposed the adoption of this method. My opinion is that in the future tanks with large diameter and of great depth will be utilized without agitators and the solution of the gold will be done by pumping from one tank to another through the centrifugal pump, similar to our method at the Central works. By this means less power will, I think, be needed, and, on the other hand, as perfect a solution of the gold will be obtained as by the use of agitators.

In a deep tank the particles of slime are a fairly long time in settling through the cyanide solution. Now, let us look at this point for a moment, and we find that we have practically the converse of the tailings treatment. In a tank where sand is being treated, the liquid moves down past each particle of sand, always keeping in motion, until it flows through the exit pipe to the precipitation boxes, the particles of sand remaining still. In a tank of say 20 feet in depth, where slimes are being treated, with a mixture of four tons of solution to one ton of slimes, the particles of slimes are gradually settling down through the cyanide solution for twenty-four hours. In other words, each particle itself has a certain amount of agitation or motion (induced by gravity) through the cyanide solution, covering a space of fully twenty-four hours before it finally finds a resting place. Now, if this pulp has been fairly well aerated before being delivered into the tank, we have a ready means of dissolving the gold in the slimes and a very cheap form of motion or agitation as well. The deeper the tank and the longer the time that is given for settlement, the closer together will the slime particles settle, and consequently the less will be the amount of moisture retained by the settled slimes. The particles will, by their own weight, gradually settle closer and closer, at the same time squeezing out the gold-bearing solution from between them; in the course of the operation you have upward filtration; so the deeper the tank, the longer the time the particle will be in settling through the dissolving medium, and the greater can be the depth of settled slimes that finally accumulate at the bottom of the tank; also less moisture or gold-bearing liquor will remain with the pulp. We can conclude, therefore, the deeper the tank is made, the fewer times will it be necessary to re-pump the slime pulp from one vat to another, and the less power will be required per ton of slimes treated.

(To be Continued.)

In the issue of the 2nd inst. appeared an article, "Electro-Chemical Treatment of Ores," from a recent paper by Gen. C. E. Webber, taken from *Industries and Iron*, London, England, and referring to an invention of a process, the patent rights of which are stated to be controlled in North America by the General Gold Extraction Co., Limited. Under date of the 7th inst, the Denver, Colo., agent of the company—Mr. Violette—writes that the vats and the process itself are covered by United States patents.

The Extraction of Copper from Residues of Pyrites Burners.

Written for the MINING AND SCIENTIFIC PRESS by R. HELMHACKER, Prague.

Since the native sulphur or brimstone is consumed only in small quantities in the manufacturing of sulphuric acid, other raw materials for generating sulphuric acid have been brought successfully in use during the last decades of years. The SO_2 is no more generated by burning brimstone, but by calcining sphalerite or zincblende ZnS or by roasting or burning of iron pyrites by improved procedures. The roasting of iron pyrites, if they are not of poor grade containing less than 30% of sulphur, is accomplished without the aid of fuel. When the SO_2 gas is evolved by the burning of pyrite FeS_2, there rest a residue consisting of iron sesquioxide Fe_2O_3 which might be advantageous as iron ore for the pig-iron melting works if the pyrite did not contain a slight quantity of admixtures, which were almost thrown aside by the factories as valueless, or they were partly used only as mineral paint. Most of the iron pyrites contain chalkopyrite, arsenopyrite, pyrhotite and other minerals, with copper and traces of silver or cobalt, zinc, lead, arsenic, bismuth and other metals, which, when burned, contain CuO, Cu_2O, Cu_2S or $CuSO_4$ and other combinations of elements, making the pyrites residue or Fe_2O_3 not valuable to be reduced immediately to pig iron. But a commercially successful process attacking the problem to recover the copper from the residue from the pyrites burning method permits to free the pyrites residue from the small amount of copper contained in them by a leaching process.

The most used process to extract the copper from the pyrites residue is the modified Hœpfner method, by which the cupriferous iron sesquioxide is first either chlorinated by calcining with common salt (NaCl) or leaching with salt, by which the copper subsulphuret is decomposed with copper chloride to copper chloride and sulphur slime. If calcium chloride is then added, the copper is more easily electrolyzed than if only common salt were the leaching ingredient. The formed silver chloride is also leached in the solution of natrium chloride, as it is soluble in a slight degree in it. This method had undergone many changes and is modified and complicated when the silver and cobalt salts are to be extracted, wherefore other ingredients as limestone and hydrochloric acid are also used, the first either to decompose sulphates or to precipitate chemical cobalt combinations from solutions, the last to dissolve some byproducts or flume slimes. The way is generally to receive a solution of copper (sulphate or chloride) in common salt and precipitating it with scrap iron to precipitated copper, which, containing silver, cobalt or other metals, is refined either on the dry way by smelting processes or again dissolved and electrolyzed in a solution to which calcium chloride is added. In prosecuting the leaching process, other precipitates, namely, the flume slimes, are obtained, which must be recovered by other processes. But in case the residues of pyrites contain silver, this metal is first precipitated in the solution by fine divided copper to a silver slime, and afterward the precipitation of the crude copper with scrap iron takes place. The precipitation of cobalt slimes, mostly with carbonate of lime, is done either before or after the copper precipitation. The precipitated copper can be again refined by the humid electrolytic process. When the chemical constitution of the solutions and precipitates is known, modified methods of treating the products and other chemical processes may be adapted by each one knowing the principles of the analytical chemistry to obtain satisfactory results.

The pig iron works at Vitkovice, near Moravian-Ostrow, in Moravia, Austria, applies such methods of leaching the burned pyrites residue in a plant erected in the year 1879. The residue from pyrites from burners from Austrian and foreign sulphuric acid factories are extracted, to recover the silver, copper and also the cobalt contained in them. All the pyrites residue—that is, the oxide of iron—treated in this establishment yield from 3.3 to 5.0 kg. Cu, and from 15⅞ to 25 gram. Ag, or an average in all the raw material extracted during the years 1880 to 1895, 4.0 kg. Cu, and 20 gr. Ag per ton, besides very small amounts of sulphur, zinc, lead, cobalt, etc. During the time from 1879 to 1895: 460,800 tons residues of pyrites, or in the yearly average 27,100 tons were treated. The capacity of the leaching plant is becoming always larger, for the bulk of extracted pyrites residue amounted to 13,350 tons in the year 1887, while, increasing at a rapid rate, it reached 51,750 tons in the year 1895.

The plant in the Vitkovice Copper Extracting and Electrolytic Works consists of four calcining furnaces, one heating furnace, one waste metal melting furnace, two mortar mills, many extracting vats and an electrolytic apparatus, the last working since the year 1886. To utilize the small amounts of metals contained in the residue of pyrites burners, the following materials are used to free one ton of them of the valuable admixtures: 90 kg. sodic chloride, common salt for chlorinating, calcination and extraction, ¾ kg. limestone (carbonate of lime), 9 kg. calcium-chloride, $\frac{3}{10}$ kg. hydrochloric acid, 2.6 kg. scrap iron (wrought iron and not cast iron) for precipitation of copper; further 9½ kg. coke, in case the precipitated copper is melted to crude copper, and 330 kg. mineral coal, slack coal and coal slimes from the wet coal dressing mill, for heating the furnaces and warming the solutions in the vats.

The output of the residue of pyrites utilized to the fullest extent is, from 1000 tons leached matter: 74 kg. silver slimes, yielding about 27½% fine silver, 6524 kg. precipitated copper and 867 kg. vats and flume precipitates, 160 kg. sulphur slimes and 317 kg. slimes having their value in cobaltic chemical combinations, which are further decomposed in chemical factories. The precipitated copper from the first processes before they were improved by the foregoing precipitation of silver and cobalt compounds, showed, dried at 100° C. in average samples, the composition, according to Schneider:

Cu = 11 30, Ag = .521, Au = trace, Cu_2O = 65.31, Bi_2O_3 = .19, Fe_2O_3 = 3 86, ZnO = 45, As_2O_3 = 1.18, P_2O_5 = .20, Cu_2Cl = .32, FeCl = .16, CoCl = .29, NiCl = .07, As_2Cl_3 = 1.32, $PbSO_4$ = 2.19, $NaSO_4$ = 3.39, $CaSo_4$ = 5.32, $MgSO_4$ = .59, Fl_2O = 2.98; total, 99.641.

The silver yielding (not yet desilverized) precipitated copper, melted in crucibles without any flux, but some charcoal dust, to crude copper, showed the composition, by an alalysis made by Schneider, as follows: Cu = 92.752, Ag = .699, Au = .001, As = 1.452, Bi = .188, Pb = .760, Fe = 3.10, Co = .178, Ni = .051, Zn = trace, P = .055, S = .190, O = .360; total, 99.797.

At present the solution is first desilverized by precipitating the silver with fine divided copper. The copper is precipitated by means of iron, and is, therefore, when melted to crude copper, while containing any silver, not to be desilverized on the dry way in smelting works.

The sluice slimes from the copper leaching show, dried at 100° C., tested in average samples, the composition, according to Privoznik: $Ca\,So_4$=47.357, $Mg\,SO_4$=3.351, $Na\,SO_4$=17.136, $Pb\,SO_4$=6.349, NaIl=4.273, Ag Cl=1.010, Cu Cl=3.220, Zn Cl=1.519, Fe Cl=.803, Au=trace, As_2O_3=.223, Fe_2O_3=5.564, Nl_2O_3=.595, P_2O_5=.328, SiO_2=1.980, Fl_2O and loss 6.292; total, 100.000. The slimes are yet valuable for the extraction of Cu and Ag in solving them and precipitating these metals.

As the analyses show, the precipitated copper contains some cobalt compositions which are utilized by precipitating them with CaO or $Ca\,CO_3$, or other reagents, either from the solutions before the copper is precipitated, or after this is done, according to the chemical methods chosen for the elimination of the salable substances contained in the residue of pyrites. The obtained precipitated copper and the copper in the flume slimes is refined since the year 1886 in an electrolytic plant, giving from 1000 tons treated residues an output of 3646 kg. electrolytic refined copper, either in the shape of cathode sheets or as common galvanic copper and refuse copper. At once blue copperas or copper sulphate is extracted, the average output from 1000 tons leached residues amounting to 1180 kg.

The iron oxide forming the residues, from which the above named substances were eliminated, is now valuable for pig-iron melting; and being mixed with other iron ores, is valued at 7 florins per ton. The silver in the silver slimes, which yield about 27½% of it, is falling off in the price. Seven years ago it was sold at 21⅜ to 20 florins per kg., while in 1895 only 13⅔ florins were available. The copper shows also, when compared with the prices nine and five years ago, which were 810 and 630 florins per ton, a slight decline three and two years ago to 704 and 768 florins; but in 1895 it was only salable at 500 florins per ton. The copper sulphate being steady on the standard price of 200 to 180 florins per ton, it fell in the year 1895 to 150 florins.

POPULATION is always on the increase. Land is not. Therefore land is becoming more valuable all the time. Real land values never depreciate. When they seem to do so it is because fictitious values have been placed upon them, or because of the increased purchasing power of money—always on account of some extraneous but relative condition or circumstance. It is a fact, too, plainly apparent and irrefragable, that intelligent application of productive industry to land is sure of adequate reward. Investment of money capital or the better capital composed of brains and muscle, is always safe and desirable. It is especially so at this time when the purchasing power of money is relatively at its maximum.

T. A. RICKARD says: "A 'vein' is a fracture in the rocks carrying ore; when such a fracture cuts across the bedding planes of the country it is styled a 'true fissure vein;' when the fissure vein is not inclosed by a single rock formation, but has one wall of one kind and the other wall of another kind of rock, then it is a 'contact fissure vein.'"

THE Gaston Ridge mine, formerly known as the California, at Graniteville, Nevada Co., Cal., which was bonded from C. D. Lane for $50,000 to Hutchinson & McCutcheon of San Francisco and Peaslee & Smith of New York City, has been bought for that amount by the latter named. The purchasers will put up a 20-stamp mill.

The Dredging Engineers' Report.

In Sacramento, Cal., on the 9th inst., at a meeting of the Board of Public Works, the following report on dredgers was submitted:

Department Public Works, Sacramento, Cal.—GENTLEMEN: Complying with your inquiry of Jan. 20th, '98, concerning dredging machines, asking at what points on the Sacramento and San Joaquin rivers, if any, a hydraulic dredger could be used to advantage; what make of dredger we would recommend as the best; its cost, capacity and cost to operate; what disposition we would recommend to make of the material taken out of the rivers, and whether or not the work that could be done with a dredger would justify the expenditure for purchase of such a machine, we have the honor to submit the following report:

By a hydraulic dredger we mean a machine which generally by suction, aided by other mechanical devices, removes material from the bed of a river, and by the aid of water conveys through pipes such material ashore or deposits it in other places in the bed of the stream. All machines of this character are protected by various patents, and their unauthorized use might lead to vexatious litigation. Some hydraulic dredgers use buckets or conveyors for hoisting the excavated material into a pipe or hopper, and then by the application of pumps force the spoil ashore.

For economical purposes hydraulic dredgers use centrifugal pumps either for lifting the material or for forcing it ashore, generally for both purposes. Where the material to be removed has to be deposited on a bank or levee exceeding about 15 feet in height above the surface of the water, the expense of handling is greatly increased, and for this reason for the purposes of levee building they are not considered as economical machines.

For purposes of rapidly cutting a channel through or over a bar, provided the material can be redeposited in the river or on a low bank, even though the place of deposit be several thousand feet distant, a hydraulic dredger is eminently the economical one to use.

On material such as is found in the San Joaquin river, where cut-offs have heretofore been made, such machines have not been tried, though the opportunity has been given and machines were available. The work was open to competition, but the hydraulic machines failed to get the award, either because their owners failed to bid or because the owners of other types of machines underbid them.

For ordinary channel making, where the excavated material can be placed on the bank or laid up in the form of a levee at a convenient distance alongside the cut, the clamshell and bucket dredgers seem to have an advantage over the hydraulic machines. Moreover, when any hydraulic machine places the spoil ashore it is done by the aid of water, and the volume of water required to convey the solid matter ashore varies from three to ten times that of the solid matter.

In a country where crops are under cultivation this type of apparatus cannot well be used. Bars only interfere with navigation at and during low-water periods; it is at such times that they can be most easily and economically cut through, but at such periods the river banks themselves are far above the water surface, and if, as has been stated, the banks are 15 feet or more in height, the cost of pumping the material to this height again becomes excessive and ceases to be economical.

For purposes of bar removal in streams like the San Joaquin and Sacramento rivers it is doubtful if the United States Government would permit the material excavated from any one bar to be redeposited in the bed of the stream, for the reason that much of it would, through the action of currents, fail to remain where deposited, and would find lodgment on other shoals, to the detriment of navigation.

The largest hydraulic dredgers yet built are in use on the Mississippi river. One, known as the Alpha, was built in 1894. The tests, which were published throughout the country, were phenomenal; generally such tests rarely exceeded one minute in duration. Such results have not been maintained in actual working operations. The Mississippi River Commission, however, has reported the work done by this machine during eighty-four days in 1895, based on five separate tests. These tests showed a capacity of 531 cubic yards of sand per hour discharged through 1002.5 feet of floating pipe. In these eighty-four days a record of the performances of the machine was kept, from which the following extract is taken:

	Per cent of total time.
Towing from bar to bar	4.6
Repairing plant	.5
Repairing machinery	2.4
Placing dredge and dropping back	5.9
Operating (actually dredging)	70.6
Sundays and holidays not working	14.7
Boats passing	1.3
Total	100.0

The cost of the machines, monthly cost of operation, and the total number of cubic yards removed are not stated; it is therefore impracticable to deduce from the above record the average cost per cubic yard of the sand removed; but the *Engineering News* of February 17, 1898, states that the cost varied from nine-tenths of 1 cent to 15 cents per cubic yard. The average deduced cost is 1.55 cents per yard.

Another hydraulic dredger, called the Beta, has since been built, but we have no authentic reports of her performances. During the past year, however, two additional hydraulic dredges have been built for use on the Mississippi river. They are supposed to possess all the latest improvements, were built at South Milwaukee, and cost $102,400 each. Each machine is believed to have a capacity of 1,000 cubic yards per hour, requires a crew of from forty to forty-five men when running double shifts, and the monthly running expenses are estimated at a little over $5,000 each. Should these machines come up to expectations, it can be calculated on the above basis that the monthly output would be about 500,000 cubic yards, and the cost would be about 1 cent per cubic yard.

There are two good hydraulic dredgers in California, whose performances are well known. They have from 250 to 275-horse power each; either can be duplicated at an estimated cost of $60,000. They have been working at Oakland harbor and elsewhere. Their working expenses, running one shift per day, are about $2,200 each per month. They have worked in depths of twenty feet of water, have pumped material ashore through 6,000 feet of pipe and deposited the same at heights varying from three to fifteen feet above water level. Their output per hour and cost of delivery in material of different character has been as follows:

Soft, plastic mud—300 cubic yards per hour; cost, 6 cents per cubic yard. Mixed sandy clay and mud—100 cubic yards per hour; cost, 10 cents per cubic yard. Soft hard pan—90 cubic yards per hour; cost, 15 cents per cubic yard. Hard pan—40 cubic yards per hour; cost, 25 cents per cubic yard.

The Government dredge which has for years been working in the rivers of this State is a combination of an endless chain bucket dredge, with a hydraulic apparatus for carrying material ashore. Her original cost was $50,000; the average cost of all work done by this machine has been 8.4 cents per cubic yard.

It is known that the most modern types of clamshell and bucket dredgers now in use in the rivers of this State generally used for reclamation, levee building and channel rectification, cost not to exceed $24,000. Their average output exceeds 100 cubic yards per hour; their monthly running expenses are less than $1000, from which we deduce that the average cost for handling material and placing it ashore does not exceed 4 cents per cubic yard. In fact, contracts can be made to do work of this character at from 5 to 6 cents per cubic yard.

A dredging machine owned by the State would hardly be in use during one-half the time in a year; the cost of maintenance is constant, repairs frequent and expensive; deterioration, whether in use or not, is rapid, and the work which may be required in the rivers of this State is of such a varied character that no one type of machine can do it all economically. Machines suitable in character can nearly always be obtained for hire, or for doing a certain piece of work by contract, at a reasonable price over actual cost.

We do not know of any place on the Sacramento or San Joaquin rivers where, with the improvements in contemplation by the State, it is advantageous to either purchase or build a hydraulic or any other type of dredging machine.

For reasons above stated, and looked at simply as a business proposition, with the amount of money appropriated by the State, and available for the purposes mentioned in the act, we do not feel warranted in recommending the purchase and maintenance of any dredging plant.

M. A. NURSE, Chief Engineer.
W. H. HEUER, Con. Engineer.

A Unique Mining Power.

The following is about as credible as similar "mining items" by space writers in the daily press. It is from the Los Angeles, Cal., *Times:*

L. B. Andrews has been spending a few days in Los Angeles. Mr. Andrews has mines south of Death valley, in San Bernardino county. He says that within the past few months he has discovered some rich stringers of gold-bearing quartz between Shadow mountain and Death valley. His ingenuity had been, however, severely strained in devising means of working the ore. Considering the distance to railroad transportation, he deemed it out of the question to ship his ore at a profit. Wood and timber there were none, and only sufficient water for camp purposes and an arrastra. No feed in sufficient quantity for animals was to be had, and it began to look as though Mr. Andrews would be forced to abandon his find. "I was about to pull up stakes and break camp," said he, "when an idea struck me, and I determined to carry it out. The section in which I am located is particularly sandy, and the wind blows at times with great velocity. I thought that a means could be devised for utilizing both. To think was to act, and I proceeded at once to secure the necessary material for my plant. I first built an immense bin, capable of holding many tons of sand. Below this bin I erected a large overshot wheel, gearing from the wheel to an 8-foot arrastra, which I had constructed. Alongside the sand bin I also erected a windmill, and to this I geared a line of elevator buckets, each bucket capable of holding about ten pounds of dry sand. After I had completed the work, I turned my windmill loose. The buckets would take the sand and pump it into the bin; from the bin it found its way to the overshot wheel, and from the wheel I derived abundance of power with which to run my arrastra. I have a calm once in a while, but as my bin is capable of holding a large surplus of sand, so far I have been able to run continuously, with the exception of a few hours, and with proper regulation I do not think I would have lost that time.

"Had I sufficient water for milling, I am confident that I could keep a 5-stamp mill going with my sand power. I have now had my arrastra working continuously for fifty-two days and nights, and am pleased with my new power. I have not found it necessary to make any repairs, except for the first few hours in starting, and since then everything has worked like clockwork."

Mr. Andrews showed as an evidence of his first work a 42½-ounce gold brick, valued at about $750. He proposes to at once take out letters patent on his new device, as he believes that ere long the power will be in general use throughout all the desert sections.

Science's Newest Wonder.

One of the most interesting features of the Paris exhibition of 1900 should be Herr Szczepanik's apparatus, by means of which actual scenes are made visible to people hundreds of miles away from the spot. The objects are to be reproduced in all their varieties of color, light and shade, and every phase of movement is to be represented. Such is the promise of the inventor, and the facts that he has received nearly a million and a quarter of dollars for the exhibition and French rights of his patent would seem to prove this poor Galician schoolmaster has really solved the problem on which many people have been working.

Herr Szczepanik calls his apparatus the "telectroscope," because it renders objects visible in their natural colors at a distance by means of electricity. The manner in which this is effected is somewhat difficult of clear explanation. From the inventor's representative in London the following particulars have been gathered as to the method of transmission:

Roughly speaking, the picture is broken up into a number of points. Each point is reflected in mirrors and the reflected ray of light is converted into an electric current, which can be transmitted at any distance. At the receiving end the current is again transformed into the corresponding ray of light. This ray of light is reflected in mirrors and the reflection thrown upon a screen. Now, it follows that if all the points of a picture are taken in very rapid succession, the resultant reflection on the screen will be the entire picture.

In greater detail, it seems that there are two mirrors at the receiving end and two more at the transmitting end. Each mirror has its surface coated with some opaque substance. Across this opaque covering a straight lined scratch is made with a needle or knife, so that only a narrow linear strip of reflecting surface is exposed. The purpose of this is that only a single line of the object under observation may be exposed to the reflective influence of the mirror. The mirror (the first one in which the object is reflected) is fixed on a pivot, by means of which (with the aid of an electro-magnet) it is continually oscillating, so that the lines of the object under observation are continually changing.

Each of these single line pictures is broken up into points by means of the second oscillating mirror, which is placed at right angles to the first, so that its reflecting line is at right angles to the reflecting line of the first. As two lines intersect each other in a point, it follows that only a single point of the reflecting line of the first mirror will appear in the second mirror, and therefore only the reflected ray which corresponds to this point will be reflected in the second mirror. The two mirrors oscillate synchronously.

This ray of light, which corresponds to a certain point in the picture, is converted into an electric current by the employment of an electric battery with a selenium cell. The property of a selenium cell is that its electrical resistance varies with the color of the light to which it is exposed; it is energized in different degrees by different rays. A blue ray, say, will have a very powerful effect upon it, while a red ray will set up a very weak current.

This electric battery is connected by wires with an electro-magnet at the receiving end, where the electric currents are to be reconverted into rays of light. The electro-magnet will accomplish this by moving in sympathy with the electric current sent out from the transmitting apparatus, and its movements will necessarily correspond to the nature of the ray reflected. A blue ray, for instance, would move it a considerable distance, while a red ray would only slightly deflect it. This magnet is made to move a prism, which is placed in front of a strong white light—either the light of the sun or an electric light. The action of the prism will break the white light up into seven prismatic colors. These colors are spread out in a spectrum.

The prism being moved by the electromagnet, it will necessarily revolve just so far as to bring the required color into view. This color will now be reflected in one of the two mirrors at the receiving end. And just as the action of the other two mirrors was analytic, so the action of these two is. Each point of the picture is reflected on a screen, and as the points follow one another in very rapid succession indeed, the eye of the observer will take in the impression of the entire picture as if its points were all presented to it simultaneously. The picture can be made to last as long as may be desired by constantly reproducing the effect, and at such a speed that the observer is unconscious of any break in the process. It is no more difficult to reproduce a moving picture than a still one, for the inventor explains that "it is the actual picture which is reproduced, and not a mere record, as in the case of the cinematograph."

Another point claimed is that there is practically no limit of the distance within which the apparatus can be used. With the possibility of a telephone wire 1000 miles long, such as that between Chicago and New York, the inventor thinks that the telectroscope wires might be of any length. Such an instrument, of course, opens up a wide field of possibilities. Scenes of foreign travel, battle fields during action and the eclipse of the sun are only a few of the things we might have seen recently, while sitting comfortably at home, had Herr Szczepanik had his machine well established a little earlier. As it is, the question arises, has not this Galician genius done away with the necessity of visitors actually going to Paris in 1900?

In the April *Century* there are several papers devoted to the Pennsylvania coal regions. H. E. Rood writes of "A Polyglot Community." He says, concerning the foreign miners: The first purchase made by Slovak or Polack is a revolver, by Italian or Sicilian a stiletto; then the newcomer buys a silver watch; and after that is secured he begins to save money. If the Slovak or Polack is particularly thrifty, he postpones buying a revolver for several months, and carries in one pocket a round, hard stone, large enough to crush a man's skull, and in another a piece of iron filched from the colliery scrap heap. The Italian or Sicilian, too poor or too penurious to afford a stiletto, buys, begs or steals a long file, and sits down in his shanty or by the roadside, with two or three stones, and grinds it to a keen edge and a needle-like point. Then he fastens the blunt end in a corn cob, and has ready for use a weapon of no mean possibilities. Once armed, however, and provided with a watch, the foreigner manages to live at a total expense of about $6 a month—and this may be regarded as a liberal estimate in most instances. The remainder of his wages is saved toward the purchase of a vineyard or farm in the old country, whither almost all expect to return and spend their lives.

The problem of the most available and efficient method of public lighting still remains to be solved, service and economy being the great desiderata. The plan of very high towers with clusters of electric lamps, calculated to light extensive areas, is generally declared to have proved a failure, leading to their abandonment; towers of 125 to 150 feet, supporting two or four lamps, and placed at frequent intervals, are reported in a few instances as being successful, but in many others have been superseded by a different arrangement. The suspension of electric lamps at the center of street intersections, the method most generally adopted, has been regarded as somewhat desirable because of the superior radiation, but, on the score of appearance, the mast arm is pronounced much preferable. A height of 35 or 40 feet has many advocates as the most effective for arc lamps, but, as showing the difference of opinion in this matter, different cities suspend their lamps anywhere from 8 to 40 feet aloft.

Accumulation of Amalgam on Copper Plates.

Discussion of the paper of R. T. Bayliss (published herein) on the accumulation of amalgam on copper plates, continues. F. Owen, as noted some time ago, said:

In connection with the discrepancy observed by Mr. Bayliss in the relative fineness of the bullion obtained afterwards by scraping the same plates, a somewhat similar experience with a different class of ore may be of interest.

The observation to which I refer was made at the El Silencio mine, situated at Remedios, department of Antioquia, Republic of Colombia. The ore consisted of auriferous (mixed with a little arsenical and occasionally antimonial) pyrites, galena and zinc blende. The proportion of pyrites in the ore ranged from 1 to 12 per cent. The average assay value of the ore was one ounce gold and five ounces silver per long ton. It was mined at a depth of from 220 to 285 feet. The gangue was quartz and the country rock syenitic granite, often much decomposed, so that it was easily crushed. The proportion of silver to gold was found to be considerably higher in the galena than in the pyrites.

The ore was treated in a wooden 16-stamp mill, common in Colombia and Brazil. The shoes were of cast iron, weighing 140 pounds, and the total falling weight was 200 pounds. The mill was run at forty drops of five inches per minute. The screens were of 20-mesh diagonally punched Russia iron. Silver-plated copper plates, 4 feet long by 2 feet 6 inches wide, and set at an inclination of one in twenty, were used outside the battery only and were cleaned up once in twenty-four hours. The usual grade of bullion produced was: Gold, 600; silver, 350; total, 950. The amalgam contained from 55 to 60 per cent of sponge gold, which lost from 1.5 to 2 per cent in melting.

In February, 1891, four old plates, which had been in use from two to two and a half years, were scraped and produced bullion to the value of $22,500. The amalgam obtained by scraping contained from 45 to 50 per cent of sponge gold, which lost from 3 to 4 per cent in melting. The grade of the resultant bullion averaged: Gold, 450; silver, 300; total, 750; whereas, judging from the proportions usually obtained from the plates, one would have expected it to show: Gold, 473; silver, 277. After chipping off all the amalgam as far as practicable, the plates were melted down into thirty auriferous copper bars, which realized $750.

At the Atlantic City meeting of the A. M. I. of M. E., February, '98, C. N. Fenner of New York said: "A possible explanation of some of the phenomena of amalgamation cited by Mr. Bayliss and others has occurred to me. We know that if to a quantity of mercury gold and silver are added until a putty-like paste is formed, and if this mass is spread on a flat surface and pressure is applied, a more fluid portion of the mercury will be squeezed out from the rest, carrying gold and silver with it. The proportion of gold to silver will depend, I think, upon various causes and conditions—the relative chemical affinity which gold and silver have for mercury; the amount of pressure used; the presence of other metals; possibly also the temperature and other minor influences. In most cases, however, the proportions of gold and silver in the two portions will be quite different. This is in conformity with the generally accepted theory that amalgams form definite chemical compounds, which, however, are often either dissolved in an excess of mercury or mixed with an excess of the solid metal.

"This operation must not, of course, be confounded with the process of straining the mercury through chamois, which latter holds back nearly all of the foreign ingredients and permits the mercury to pass through.

"In order to confirm and illustrate the point to which I wish to call attention, the following experiment was made:

"Gold and silver were thoroughly incorporated with mercury, forming a moderately stiff amalgam. This was pressed between two glass plates, and the portion that oozed out in drops was separated from the dry residue. Each part was melted with lead and assayed for gold and silver. The more fluid part yielded 9.4 milligrammes of gold and 164.4 of silver. The residue yielded 7.8 milligrammes of gold and 159.75 of silver. In other words, the ratio of gold to silver in the more liquid amalgam was as 1 to 17.5, while in the residue it was as 1 to 20.5.

"These facts have, I think, a bearing upon the phenomena of scale-formation which have been discussed. When a free-milling ore passes over an amalgamated plate, the gold and silver, and small quantities of other metals, are caught by the mercury. In most cases the process of cleaning-up removes the resulting mixture. Occasionally, however, due perhaps to less fluidity of the amalgam, the pressure of the scraper effects a partial separation, in a manner similar to that of the experiment cited. The mercury squeezed out has probably always a tendency to carry with it fixed relative proportions of gold and silver, as influenced by chemical affinity, but various other causes greatly modify this result.

"I think there can be little doubt that silver has in general less tendency to amalgamate than gold. The increase in the proportion of silver at a distance from the battery discharge, which means that more gold relatively is caught at first, supports this proposition. At the Drum Lummon mill the cleanup bullion had the ratio of silver to gold of 1 to 1.25, while the ratio in the scale was 1 to 0.76; at the El Silencio mill the ratio in the cleanup was 1 to 1.71, and in the scale 1 to 1.50. These figures also apparently show a tendency of the gold to follow the mercury."

Shaft-sinking (on the Witwatersrand), with few exceptions, has been done by native hand labor, the rate of progress in a well-started shaft being from 60 to 164 feet per month, 156 feet being done in the west shafts of the Simmer & Jack East for the month of July and 164 feet in the west shaft of the Angelo Deep for the month of August, the former in quartzite and the latter in slate. This rapid rate of sinking could not have been much exceeded by machine drills, for the time lost in sinking is spent in removing the dirt from each succeeding blast, which must be done by hand labor and occupies at least one-half or five-eighths of the whole time. For this work the highest wages paid to natives is 2s 6d per shift, with the incentive of a bonus per foot for sinking in excess of a certain amount per month. The average rate of sinking for the first nine months of 1897, in two deep shafts in which rapid work has been done, was a trifle over 100 feet per month, and the cost per foot, including white labor, native labor, compound expenses, timber, explosives, lubricants, fuel, miscellaneous stores, maintenance, and engineering fees, was £21 19s 7d.—H. H. Webb and B. Yeatman, Engineering Magazine, April.

The demand of the hour, the crying want of the age in every trade in every department of commerce, in every occupation, in every business, whether great or small, is for men and women who know how to do things, to do them accurately; to do them at the right time; to do them with neatness and dispatch. There are plenty of people who do things after a fashion, who are satisfied with loose-geared and slipshod methods, whose highest ambition is to get through the work of the day, the week or the month and draw their pay; who take no pride in their work, find no enjoyment in seeing the best possible results grow out of their efforts. If the "boss" will let it pass, it suits them all right, good or bad. They have no interest in the outcome of their labor, except that which grows out of being able to draw their pay, which they always want to measure by the time that has expired, rather than by the efficiency of the work they have done, or the profits which may have accrued to their employers. The only stimulus to activity which they know is a sordid one, and has relations to the cash it brings.

Change in Mining Methods.

Readers who keep an eye on Eldora, the new mining camp in Boulder county, will have an opportunity of contrasting modern development methods with those which prevailed in Colorado some years ago. At the southern end of the Gilpin gold belt Empire is located. Thirty years ago Empire was the scene of a gold placer excitement, followed by considerable development work on a number of large veins. Yet no railroad followed in the wake of this development, and when the stamp mills failed to extract the values the mines were practically abandoned.

It is different at Eldora. The stage-coach tracked the prospector into that district, and in less than a year the telephone followed, supplemented by the railroad surveyor. The camp has at present a large tunnel under way that will answer both drainage and transportation purposes for a number of mines. An electric power plant and a tramway system are also projected, so that the first shipments of ore to the treatment plants will be facilitated by appliances which Cripple Creek secured after two years of trial, and which Leadville had to wait for in spite of the millions her bonanzas yielded in advance of the railroad's approach.

In the matter of ore treatment Eldora is not a one-process camp. The failure of stamps will not tie up the mines as it did in the pioneer days of Empire. Concentration, cyanide, chlorination and smelting are all in order, with agents waiting at the mouth of the mines to bid on the ores.

This change in conditions illustrates the rapid gain in output in this State as compared with former years, when mining was costly, transportation difficult and high, ore treatment crude and the price of machinery and supplies at figures which prevented the handling of low and medium grade ores. As the two latter classes far exceed in quantity the high-grade material, it is easy to account for Colorado's expected gain of 25 per cent this season, lifting the State's gold output from $24,000,000 in 1897 to $30,000,000 in 1898. And the end is not yet. Dumps that were made at high cost in Empire thirty years ago are now moving to the modern concentrators in that camp in the buckets of an automatic tramway, which reduces to a fraction the cost of hauling.—Denver News.

In an effort to secure perfect combustion by stirring of the air introduced across the firegrate of a steam boiler, and to avoid blow-pipe flames that might injure the plates, M. Poillon has adopted the following arrangement: The air inlets are, at the upper level of the grate which receives the coal, as narrow as is necessary to completely burn the whole of the fuel with a minimum of air, and at a slight pressure in order to avoid drawing along the ashes into the flues; and are wider below than above, to facilitate access of the air, and to force the flames to spread out in the form of a fan, while the inlets of the first series of plates or bars (counting from the firehole door) are inclined backwards, so that the air issuing from these inlets is deflected towards the bridge. Comparative trials, carried out by Audresset, manufacturer at Louviers, in the French department of the Eure, with a boiler having 79 square yards of heating surface, and fitted with a feed-water heater of 14½ square yards of surface, are said to have showed a saving effected by the Poillon grate amounting to 22 per cent.

What They All Say.

W. A. Scott, representing the MINING AND SCIENTIFIC PRESS, was a pleasant caller at the *Miner* office yesterday. Mr. Scott represents the best mining journal published in the United States. Mojave Miner, Kingman, Arizona.

Chas. G. Yale estimates the year's output of gold from Alaska at $20,000,000.

Alternating Apparatus.

Fig. 2 illustrates the standard belted type alternator, built by the Walker Co., having a sub-base *a* upon which is mounted the stationary armature ring frame *b*. This frame is divided into halves on a horizontal plane, so that the upper half can be removed to inspect and repair the armature bobbins or to remove the inductors. The armature core, which is made with inwardly projecting teeth, is of laminated steel, held firmly in the armature ring frame. The armature coils, rectangular in shape, and machine wound, are arranged around its inner surface, imbedded in slots formed on the inner periphery. The armature core is ventilated by air ducts passing radially through its mass, as in the revolving armature of the direct current machine. The armature frame is hollow, with openings shown at *c*, permitting the air to circulate through the armature air ducts and around the core iron and armature coils. The entire armature with its frame can be moved parallel with the axis of the shaft by removing the bolts *d*, which fasten it to the sub-base, thus uncovering the armature coils for inspection or repair, without the necessity of removing the upper half of the armature. The inductor *e* is carried by the shaft *f*, which is made to rotate in the bearings *g*.

This inductor consists of a hub made of steel, with radiating arms or spokes at either end, which spokes alternate in spacing and have their outer ends bent into line over the center of the hub, leaving an annular space around the hub, where the single field magnet spool is carried, wound with the shaft as its axis. The ends of the inductor spokes are tipped with blocks of thin laminated steel to avoid heating them by the formation of eddy currents. Two extensions of the hub are provided—one outside of the inductor arms at either end. Upon one extension is carried a pair of collector rings *h*, which carry the current from the exciter to the field magnet coil, which rotates with the inductor.

The company is now installing a long-distance transmission plant at Dallas, Texas, which is expected to be placed in operation by May 1st.

The Walker Company is represented by H. C. Wybro, Chronicle Building, San Francisco.

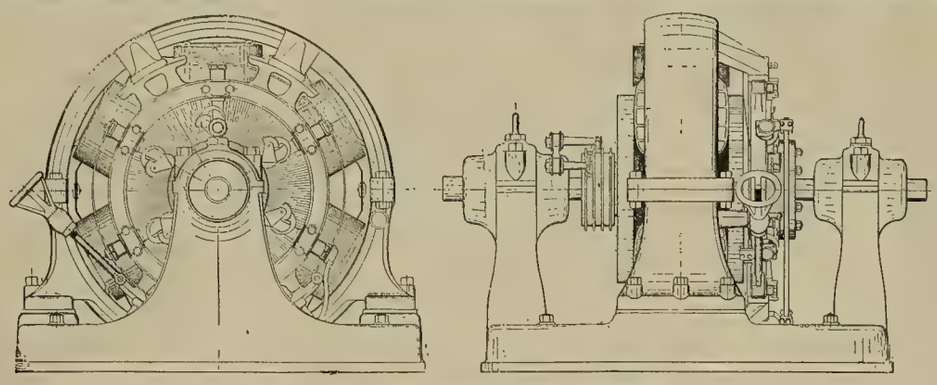


FIG. 1.—WALKER ROTARY TRANSFORMER.

How Coke is Made.

Some one has called coke "mineral charcoal." He meant that coke was soft coal from which the gasses had been expelled by heat out of contact with air, just as wood is made into charcoal by being burned without air. The crushed coke, which is becoming a favorite fuel with housewives and cooks, is the coke left as a residue in the making of illuminating gas. It is soft, dull black and has a pumice-like texture, but the coke which is made for foundries and blast furnaces is hard and is of a silvery gray color, almost metallic in its luster. This is the Connellsville coke, produced in the coke region of Pennsylvania, made famous by its bloody labor strikes and fatal conflicts between the "Huns" and malitia. Thousands upon thousands of tons of coal are mined in the Connellsville country and burned in the thousands of ovens into coke, and when any labor trouble checks the output of this region, foundries, machine shops and blast furnaces all over the country shut down. The two experimental ovens which were built in this district fifty-three years ago have grown into 20,000 ovens, and the few bushels of coke which the pioneers tried vainly to sell have expanded to over 5,000,000 tons yearly.

The very nature of the industry connects the coal mine and the coke oven with the closest intimacy. The ovens stretch out from the shaft top on either side of the railroad tracks, built so close together that the "bank" looks like a solid wall, pierced with low arched windows set in at short intervals. Over the bank ovens runs a narrow gauge track, and steam and smoke cloud the perspective. The Connellsville coke region is the largest producing district in the world, and their coke-making has reached its highest point toward perfection. The Connellsville ovens are what is know as the "beehive" type, varying from 10½ to 12½ feet in diameter and from 6 to 8 feet in height. Each oven produces at a charge from three to four and one-half tons of coke each twenty-four hours, which is the length of time required to produce coke from coal. All coal will not coke, for a non-coking coal will crumble with the heat, whereas, a "coking" coal will hold its substance and become a mineral sponge when the gasses are driven out.

When the coal is brought to the shaft top from the bottom of the mine, it is dumped into chutes which convey the coal to the "larries," as the small dump cars which run on the tracks over the ovens are called. Small locomotoves draw the larry wagons to the ovens in the larger plants, but in others, steel cables, horses or mules are the motive power used to carry the coal to be coked. Time and labor are saved by machinery in the mine, on the shaft top and around the ovens. The mine cars brought up on the "cages" from the bottom of the shaft are pushed off the cage and an empty car run on automatically, and other forms of self-dumping cages are used. The coal slides down the chute and over the screens into the bins from which the larry wagons are loaded.

When larries reach the ovens they are dumped and the coal slides down. When an oven is charged the coal is leveled down and the door is bricked up, and all the chinks and openings are closed with loam, except a space of about two inches at the top of the door, which extends across the full width of it. The heat of the oven—for a full charge of coal is put in as soon as the charge of newly made coke has been taken out—set fire to the coal on top. The draft and of course the air are so regulated that the coal burns from "out to in," and the amount of air necessary to keep up a slow, smoldering combustion is regulated by closing or opening airways in the door. In forty-eight hours the coal is coked and the door is broken open, and the glowing coke in the oven is drenched with water to cool it, so that it will not set fire to the cars, for the coke is loaded directly into the freight cars standing on the tracks before the bank of ovens.

Enormous quantities of water are used in cooling coke. As it requires about 600 gallons of water to cool one charge of coke, the Connellsville district, when all the ovens are at work, uses up over 5,000,000 gallons of water a day, enough to supply a town of 50,000 inhabitants. Sometimes this water has to be pumped from a distance, for the mine water is strongly impregnated with sulphur, and sulphur is just what the coke maker does not want in his product. One large coke works in this district, in order to be assured of pure water pumped it from a river eleven miles from the ovens, using an 8-inch pipe which had formerly been used for supplying a town with natural gas. The coal mined in the Connellsville district is remarkably pure and is all coked. The vein from which is taken is 9 feet thick, and the coal is mined on the "room and pillar" system. The great loss of life caused by miners using naked lamps, and so igniting the explosive gases which collect in the workings, has led many miners to adopt the electric incandescent light for the shaft, bottom, pump-room and stables, and the miners are required to carry safety lamps. As the light is none too good, many miners take fearful risks by using naked lamps. The Connellsville district has been the scene of many accidents and great loss of life.

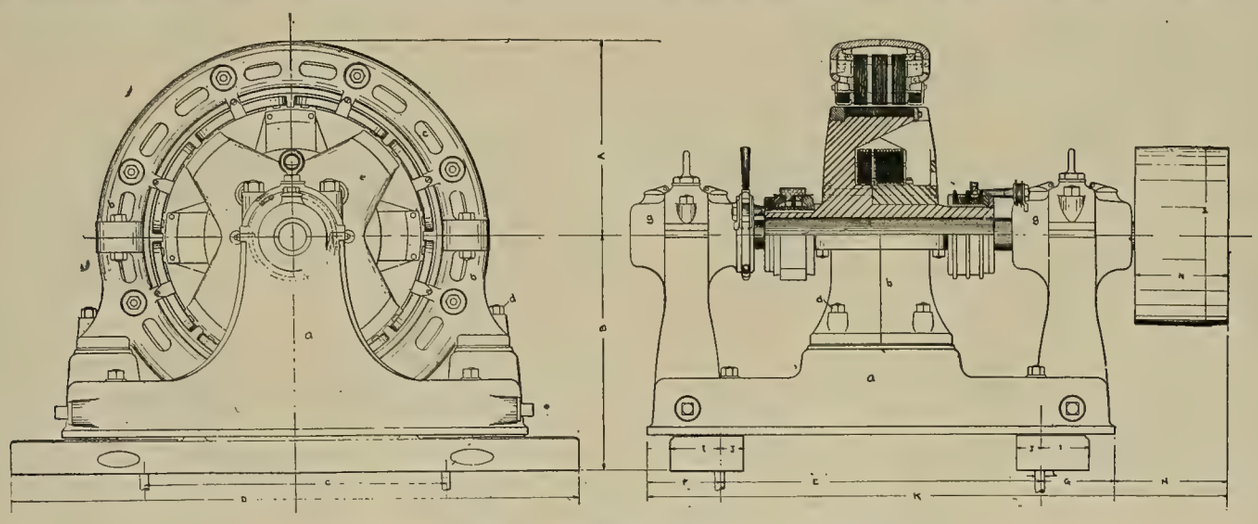


FIG. 2.—GENERAL DIMENSIONS 8-900 50 ALTERNATOR.

The Trade School.

One-fifth of the able-bodied population of the United States is said to be engaged in the mechanic arts. Such of these, and the number is by no means small, who are foreign born, had the advantages of a thorough-going system of apprenticeship and are equipped both by education and experience for their special phase of industry. To such men their aptitude for a business is a matter of second nature. It was not obtained by memorizing rules, but by normal training. It took time, in many instances covering six or seven years, and it involved discipline, not always of an agreeable, but always of a helpful kind. The modern, or rather the American idea, wants as little as it can of both, and the apprenticeship system is nothing less than a tyranny or a prolonged penance to the youth who thinks his parents and the world have made a mistake in not thinking him a man before his second teeth have made their appearance. It is a sad confession, but it's true, that in making men of boys we have made the native mechanic an exception and not a rule. It may have been a mistake in many instances of apprenticeship that the process of education has been unnecessarily slow, and that the cupidity of employers, rather than their good reasons, has managed to secure a man's aptitude at a boy's wages; but it is still a fact that in going to the other extreme we have incurred as many evils in the new system as were ecc-

nomically vicious in the old plan. One thing is sure: that we cannot subordinate the rising generation to the conditions that have placed American skilled industries so largely in foreign hands. The escape lies in the trade school. This is an industrial necessity. In other branches of education outside of the industrial we are flooding the nation with youths, who, if as they think, are fitted for what are called the professions, are yet compelled by the surplus of supply to seek some form of manual labor for subsistence.

Out of every hundred boys that graduate from our grammar schools 1 per cent enter the ministry, 1 per cent become lawyers, 1 per cent physicians, 5 per cent business men and 92 per cent get a livelihood by their hands. The minister takes his course at the theological school, lawyers at the law school and physicians at the medical school; 5 per cent enter business houses to learn the business, which means years of training, but the 92 per cent —have they a similar training? One need not be a prophet to predict results. Want of occupation or a dislike to that into which some are forced by bread-and-butter necessities, leads men into crime. The prison statistics of 1890 show that there were 52,894 white male prisoners in the United States. More than one-half of these had no trade whatever, and three-fourths of those who became criminals through lack of occupation were Americans. It may not be that the lack of trade explains the lack of moral stamina or of integrity, but it is certain that with men who work there is less temptation to crime than with those who do not. If the 92 per cent of educated youths who are turned loose on the world with no knowledge of a trade had been taught even the rudiments of some industrial calling, they would certainly have a better chance of paying for their boots and board without leaning on their parents or a telegraph pole for support. We have an alarming population of this spineless and practically helpless kind, and so long as this special article is the product of a purely mental education, the nation must foot the bill. Under these circumstances we cannot long be blind to the necessity of the trade school. It is the missing link between the school boy and the self-sustaining man. The manual school is but a proviso. In the government consular reports it is stated: "The manual school work in favor with many experienced teachers in the United States, which aims only to impart to the pupil a general manual facility, and to develop adaptiveness, without direct reference to his ultimate specific vocation, is here virtually unknown." The founders of the engineers' school at Amsterdam say: "Our school is to train engineers to run the engines on our steamers," and the charter of the Rotterdam Trade School explicitly states: "The purpose of this association is to train able mechanics." It is on these practical lines of service that the trade school meets what is becoming more and more an industrial and national necessity.

FINE coal or slack coal has proved effective as a filtering material for sewage. It seems to have a special power of removing the putrescent organic matter. The effluent is particularly bright, shows a marked diminution in the quantity of oxygen absorbed, and is perfectly free from odor. The interior of the filter, after a use of many months, has only a slight earthy smell.

Recently Declared Mining Dividends.

Montana O. P. Co., Montana, $1 per share, $40,000; April 15.

Portland, Colo., 1¼ cents per share, $45,000, payable immediately.

Reward, California, 2½ cents per share, $1200; April 9.

Silver King, Utah, 25 cents per share, $37,500; April 11.

Le Roi, B. C., 10 cents per share, $50,000; April 12.

Anchoria-Leland, Colorado, 1 cent per share, $6000; payable immediately.

Champion, California, 25 cents per share, $8500; payable immediately.

Bullion-Beck, Utah, 10 cents per share, $10,000; payable immediately.

Coast Industrial Notes.

—There are nine hundred men employed at the Corral Hollow coal mines, Alemada county, Cal.

—Moore, Ferguson & Co., of San Francisco, have bought 100,000 bushels of wheat in Linn Co., Or. The price was 70 cents net to the farmers.

—J. D. Spreckels & Bro. of San Francisco have sold three tugs to the U. S. Government, to be used as auxiliary protection to the coast in case of war with Spain.

—The Producers' and Consumers' Oil Co., Fresno, Cal., declared a dividend of 25 cents per share on 10,000 shares. The company owns six producing wells and is still prospecting.

—Eastern Nevada cattlemen say that the drought will strike Nevada on account of the little snow on the mountains. The Humboldt river now contains only 10,000 inches of water.

—The San Francisco and San Joaquin Valley Railroad has let contracts for the grading, at a cost of about $200,000, of eleven miles of road adjacent to the entrances to the long tunnel near Rodeo, Cal.

—The contract for the dredging of the Oakland, Cal., harbor goes to the San Francisco Bridge Co. The total bid was $101,500. For the jetty channel the price was 13 cents per cubic yard, $78,000; city front, 41 cents per cubic yard, $23,500.

—W. B. Howell, Assistant Secretary of the Treasury, gives notice that the following places in Alaska have been designated as ports of entry: Juneau, Unalaska, May Island, Kodiak, Wrangel, Circle City, Cook's Inlet (Saldonia), St. Michaels Island, Kuriuk, Unga, Dyea (including Skaguay) and Orca.

—The second period of the sessions of the Nineteenth congress of Mexico was opened at the capital of that republic on the 1st inst. In his message to the congress President Diaz said on the subject of mining: The present condition of the mining industry in the republic is satisfactory. During the period covered by this message, there have been issued 957 new titles, which cover 8297 claims of a hectare each, making a total of 7476 titles issued under the new law in this branch and which cover an area of 58,540 hectares The exportation of ore continues to increase, as by the data published up to date it is seen that the value of the ore exports during the months from June to November, last, reached in round figures the sum of $39,000,000 as against a little more than $28,000,000 in the corresponding six months of 1896. In that exportation silver enters with a value of $34,000,000; gold with over $3,000,000 and lead with $1,200,000. Among the exports also appear antimony and zinc ores. A good idea of the progress of the mining industry may be obtained by observing the working of any of the metallurgical establishments, founded under the protection of government concessions. The Aguascalientes central smelter received 102,349 metric tons of ore for treatment during the year 1896-97. The San Luis Potosi smelter during the same period received 57,653 metric tons, and the Gran Fundicion de Monterey 185,730. The Negociacion de la Valardena, in Durango, treated 53,240 tons. The Compania del Boleo, in Lower California, smelted 171,000 tons of copper ore and that of Mazapil 15,000 tons of copper and silver ores.

Commercial Paragraphs.

MGR. MIDDLEBROOK writes that the Janesville Iron Works, ex. office at Denver, has been awarded the contract for the large compound elevator pump, 1200 gallons per minute, for Daniels & Fisher's store in Denver. Their shops are very busy on mine pump work.

THE Colorado Iron Works Company, of Denver, Colo., made another shipment of three carloads of machinery for the Randsburg-Santa Fe Reduction Co., at Barstow, California. Up to date eight carloads have been shipped for this new mill, now being erected at the above place.

THE Westinghouse Electric and Manufacturing Company has just opened a new office at Austin, Texas. Mr. J. E. Johnson will have charge of the office and of the further extension of the Westinghouse business in the Southwest. The large contracts which this company has been handling in Mexico and the Texas region have led to the establishment of this new center of electrical trade.

THE *Two Republics*, City of Mexico, of the 7th inst. says: Two contracts were let yesterday with Mr. W. B. Pennock, the representative of the Risdon Iron Works of San Francisco, for the installing of two immense hoists with a capacity of 75-horse power, one for the La Joya mine and the other for the Los Pleaydos properties, which is owned by Congressman Ignacion Ibarguengoitia and Mr. Guillermo Brockman, the treasurer of the Esperanza Company. A contract has also been given for the sinking of a shaft in the Los Pleaydos mine, which will be one of three compartments and which will run to a depth of 250 meters.

THE Denver Engineering Works write that in the last few months they have built four special concentrating tables for different parties, each with the idea in view of economical working of their particular ore. These different tables have been tested with greater or less results, and in one instance has been so successful that the company has received an order this week for seventeen tables for one mill. They have also an order for a large cyanide plant for British Columbia, and report an additional order from Mexico for electrical hoists similar to the ones they lately sent to that vicinity. This order is for four electric hoists, three electric sinking pumps, and an electric power plant for driving it.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING APRIL 5, 1898.

601,707.—TREE PROP BRACKET—Ament & Evans, Riverside, Cal.

601,726.—BALL CASTER—G. L. Boveroux, Oakland, Cal.

601,850.—PROGRAM CLOCK—E. F. Burrill, Oakland, Cal.

601,887.—CAKE BEATER—A. W. Custer, New Whatcom, Wash.

601,795.—DRAUGHT EQUALIZER—G. F. Hillegas, Lane county, Or.

601,853.—VEHICLE WHEEL HUB—G. A. Krohn, Goldgulch, Cal.

601,835.—BATH GOWN—H. & H. E. Law, S. F.

601,972.—WINDMILL—R. Leonhart, Jr., Fresno, Cal.

601,993.—SHORE PROTECTOR—T. B. Lovdal, Sacramento, Cal.

602,023.—DUSTLESS ROAD—F. W. Mattern, Los Angeles, Cal.

601,904.—BEET DIGGER—L. Pike, Anaheim, Cal.

601,845.—ASH RECEIVER—S. M. Smith, S. F.

601,916.—ROTARY ENGINE—C. Triplett, Leland, Or.

601,743.—CULTIVATOR—J. A. Webber, Vancouver, Wash.

601,920.—PUMP—M. L. G. Wheeler, North Yakima, Wash.

601,694.—RESTORING INSULATED WIRE—N. Wilson, Portland, Or.

601,848.—BOTTLE—W. Wilson, Oakland, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

VEHICLE WHEEL HUB.—G. A. Krohn, Gold Gulch, Cal. No. 601,853. Dated April 5, 1898. This invention relates to improvements in hubs for vehicles. The object of the invention is to provide such a construction of wheel hub as will enable the maker to put the wheel together and lock the spokes firmly in place without the use of separate screws or bolts to secure the parts of the hub together. This is effected by making an exterior hub or sleeve with an interior box or journal to receive the spindle upon which the wheel turns, a fixed circular flange projecting outwardly from the hub having the inner face in a plane transverse to the axis and the opposite end of the hub or sleeve cylindrical and partially screwed thereon. Radial plates are fixed upon the fixed flange between which plates the tapered inner ends of the spokes are fitted, a second disk is made to move upon the cylindrical portion of the hub and it has an annular flange projecting from its inner plane face so that the flange will enter corresponding grooves or channels made in the inner ends of the spokes and when this plate has been screwed up tight against the spokes they will be locked firmly between the two disks and also held by the annular flange. A nut is screwed upon the outer end of the sleeve or hub so as to compress the disk firmly upon the spokes and lock the whole together.

SAFETY ASH RECEIVER.—S. M. Smith, San Francisco, Cal. No. 601,845. Dated April 5, 1898. This invention relates to improvements in that class of containers designed for ashes known as "ash receivers," and the object is to so construct the receiver as to prevent the floor or other part of the building or adjacent inflammable objects being ignited or damaged by heat conducted through the metal of the receiver when hot ashes or live coals are placed therein. It consists essentially in the employment of an asbestos jacket between the exterior and the interior sides and between the double bottoms of the receptacle. The receiver is made with offsets in its sides, the bottom being arched upwardly and having its periphery expanded into one of said offsets or grooves. A second bottom of smaller diameter has its edge turned upward parallel with the sides of the receiver and the periphery of the upper edge is expanded into the other offset or channel after the filling of non-heat-conducting material has been placed in the space intermediate between the two bottoms and the sides of the two parts. The construction is simple and easily made and is very valuable for its purpose.

PROGRAM-CLOCK.—E. F. Burrill, Oakland, Cal. No. 601,850. Dated April 5, 1898. This invention relates to that class of devices in which electric gongs, annunciators, relays, or other electrical or mechanically operated devices for signalling and other purposes are set in operation at prescribed times through the agency of a clock. The times at which these devices are set in operation refer usually to and indicate some kind of a program from which this class of devices has received the general title of "program-clocks." It consists essentially of the dial having an annular flange or circle, a node consisting of a substantially U-shaped plate having resilient side arms or members adapted to embrace said flange or circle and to be adjusted to different points thereon, a finger projecting transversely and directly from the lower extremity of one of the legs of the nodes and being of a substantially right angled triangular shape in cross section. An electrically operated clock hand having an under bent lever on its outer end adapted to extend in the direction of the movement of the hand and to travel up the inclination of the finger and an insulating strip on the under side of the lever covering a major portion and exposing the point so that when the lever travels up the slope it makes contact with the ridge or edge of the finger and thus actuates the desired mechanism.

BOTTLE.—Wm. Wilson, Oakland, Cal. No. 601,848. Dated April 5, 1898. This invention relates to improvements in bottles and is especially designed to prevent the fraudulent refilling of the bottle after its contents have been exhausted. It consists of an essentially cylindrical extension exterior to the neck of the bottle and in line therewith, means for opening and closing the end of said neck, a device upon one side of the extension exterior to the bottle neck through which liquid can be discharged when the neck has been opened, a means upon the opposite side for allowing air to enter to take the place of the discharged liquid, a means for closing the discharge aperture against any introduction of liquid through it, and means for closing the air inlet passage for similar purposes. This device consists of an automatic inwardly closing valve which controls an opening between the chamber in the upper part of the extension and the discharge passage so that liquid is prevented from entering through the discharge passage. There is also a second passage suitably arranged with relation to the first to allow air to enter and replace the discharged liquid and this passage has also a valve or diaphragm fixed in it which while it allows the ingress of air to replace the discharged liquid will arrest the passage inwardly of any liquid.

Personal.

G. WALDRON becomes Supt. Reform mine, Cripple Creek, Colo.

O. H. REICHLING, Supt. Anita mine, Jackson, Cal., is in San Francisco.

R. WALKER has resigned as Supt. Empire mine, Grass Valley, Cal.

J. E. DYE, Supt. Gold Fields Co., Jackson, Cal., is in San Francisco.

C. A. HALLEM, Supt. Two Johns mine, Deadwood, S. D., is in Chicago.

H. C. LEWIS becomes Gen. Mgr. Crœsus Con. M. Co., at Hailey, Idaho.

J. F. WEBB, Mgr. Pochahontas mine, Placerville, Cal., is in San Francisco.

F. ZEITLER, Supt. Champion mine, Nevada City, Cal., is in San Francisco.

A. H. RICKETTS has returned to San Francisco from Virginia City, Nev.

T. B. DILLON, Supt. Centennial mine, Plymouth, Cal., is in San Francisco.

T. DUNGAN, SR., succeeds G. W. Dungan as Supt. of the Trophy mine, Ferndale, Cal.

J. C. DIAMOND, managing owner Limpensel mine, Placerville, Cal., is in San Francisco.

J. T. GRIBBLE, Supt. Reward mine, Nevada City, Cal., has returned home from San Francisco.

DR. DAVID T. DAY, of the U. S. Geological Survey, Washington, D. C., is in San Francisco.

J. C. MCKEE, Mgr. New Vulture M. Co., Vulture, Ariz., has returned home from the East.

W. MCKINLAY, Supt. Providence mine, Nevada city, Cal., is in San Francisco in ill health.

C. R. MARTIN, Supt. Grant mine, Grass Valley, Cal., has returned home from San Francisco.

W. MAITLAND, Supt. Deep Gravel mine, Abrams, Cal., has returned home from San Francisco.

J. M. WRIGHT has returned to San Francisco from a trip to his mining properties at Tuttletown, Cal.

F. SEARLES, attorney and mine owner, Nevada City, Cal., has returned home from San Francisco.

HON. E. W. CHAPMAN, Gen. Mgr. Taylor mine, Garden Valley, Cal., has returned home from San Francisco.

C. MULKEY, managing owner Spreckels & Mulkey mine, Fairplay, Cal., has returned to his home in Napa, Cal.

A. B. FRENZEL of New York City is at Placerville, Cal., examining mining properties for New York capitalists.

R. H. POSTLETHWAITE has returned to San Francisco from an examination of placer mining property at Yale, B. C.

D. L. COLES, part owner of the Montauk mine, Newcastle, Cal., has returned from New York to San Francisco.

W. B. KERR has returned to Valley Springs, Cal., from Graniteville, where he had been examining some mining property.

T. CLARK, Pres. El Dorado County Miners' Association, and owner Franklin mine, Placerville, Cal., is in San Francisco.

F. RIGAUD of Paris, France, owner in the Ralston Divide mine, Damascus, Cal., has returned from the mine to San Francisco.

F. J. FLETTER of San Francisco, Pres. Brunswick Con. M. Co., Grass Valley, Cal., has returned from an official visit to the mine.

J. K. FIRTH, of the Joshua Hendy Machine Works, San Francisco, is at Bingham, Utah, inspecting property of the West Mountain Placer Mining Co.

I. E. BUSH has decided not to accept the offer of the management of an Arizona property, but will resume his position as Ass't. Gen. Mgr. Revenue mines, Norris, Montana.

Recent California Mining Incorporations.

St. Louis G. M. Co., Placerville; capital stock, $200,000; all subscribed; J. F. Webb, G. W. McKee, T. H. Hayden, T. Schaub, J. F. Webb, Jr.

Republican M. & D. Co., S. F.; capital stock, $1,000,000; subscribed, $600,000; J. Shine, T. F. McGowan, G. E. Stayton of Sonora, A. S. Orcutt of Jacksonville, J. C. Campbell of S. F.

Victoria M. Co., San Francisco; capital stock $1,000,000, subscribed $250; J. J. Dailey, S. T. Gage, C. Juster, C. E. Hayes, C. C. Wallace.

Mining Summary.

CALIFORNIA.

Amador.

(Special Correspondence).—The Pocahontas mine at Drytown this week struck a 4-foot vein on the 600 foot level that assays from $70 upwards, exclusive of sulphurets.

Drytown, April 11th, '98.

Ledger: The Baliol Co. has secured an extension of time on the Maximilian claim and will sink a prospect shaft to some depth. Five stamps of the Baliol mill will be kept running on ore from the surface cuts on the property. ——The Oleta C. & P. Co. will resume the development of its properties within thirty days.——A new shaft has been started on the Wildman - Mahoney property near Sutter Creek.——At the Ironbound near Volcano they are unwatering the old shaft and also driving a tunnel to tap the shaft at a depth of 230 feet.——At the Stud Horse the shaft has reached 100 feet. There is considerable ore on the dump, of good values.——A cyanide plant is to be erected on the Marklee mine to work the old tailings.——McIntyre & Denis have taken a bond on the Ivanhoe at Sutter Creek.——The tunnel on the Endeavor G. M. Co.'s property at Oleta has reached 600 feet. Work was discontinued to place machinery to carry air to the workings.——W. S. Lyle is unwatering the 300-foot shaft on the Fogus at Volcano.——Two shafts have been sunk on the Davis near Oleta, prospecting for gravel.

Republican: Over $100,000 in bullion left this section of the mother lode last week. It represented a thirty-day run of several of the well known producers hereabouts.——The Marsino Bros. are working the Volcano gravel claim under lease and making good wages.——It is declared by a stockholder of the Alma mine that work will be resumed shortly.

Butte.

P. Riordon is developing two properties near Oroville. He has discovered a 3-foot vein of fair grade ore.——R. P. Grace struck a ledge on his farm near Honcut which is said to yield good assay values.——The thirty stamps at the Banner mine are running steadily. The mortar blocks, made of cement instead of wood, and looked upon as an innovation at the time of their construction, are said to stand the strain of constant hammering very successfully.

Calaveras.

At the Green Mountain mine, near Mokelumne Hill, the gravel bank is 75 feet high and prospects from the top to bedrock. They are using 300 inches of water under 275-foot pressure. A dam impounds the tailings. Should the water hold out, the work will continue three months.——The Rowe & Jenkins mine, at West Point, has been unwatered and a 14-inch vein of $40 ore discovered.——Work on the Williams is being pushed.——B. Nixon has found ore of good value.——Beauchemin has several hundred tons of ore ready to mill.——The Hero mine, at Mountain Ranch, is to be reopened without delay.——The Live Oak mine, at Mountain Ranch, contemplates the erection of a steam hoist.

The Davis hydraulic mine at Esmeralda is in operation and meets with success.——Nuner Bros. will resume work on their mine at Indian creek.——A tunnel has been started on another of D. Fricot's claims near Fricot City.——O. and M. Fletcher have bonded a four-fifths interest in the Confidence mine to J. Cronan until October 23, 1898, for $15,000, $1000 of which was paid.

El Dorado.

(Special Correspondence).—The letter published in the MINING AND SCIENTIFIC PRESS from Placerville two weeks ago on El Dorado's slate possibilities was generally appreciated and received favorable comment. It might be added that these several slate quarries are favorably situated both as to the feasibility of quarrying and in immediate proximity to good roads. One particularly, on the southern shore of the American river, is but four rods from the highway, and but three and one-half miles from Placerville. Both from this and from the quarry at Kelsey a tramway to the railroad station at Placerville would be feasible. The expense of production can be reduced to a minimum for the reason that, for a long time at least, no costly hoisting machinery is required. The slate industry here is not followed to any extensive production simply for want of means. The demand is greater than the supply. It can be definitely stated that favorable terms can be had upon these properties. They should form one of the principal products of California, and possibly will with the impetus they have received through the MINING AND SCIENTIFIC PRESS.

Kelsey, April 10th, '98.

(Special Correspondence).—The Hall Con. M. Co., which began work recently on the Lloyd tunnel, which had been abandoned at 450 feet, after running 15 feet cut a 3-foot ledge of fair grade ore. At 480 feet another ledge was cut of about the same size. The work has not yet cut through the greenstone. Power drills are in use, and about 24 feet are made per week. The Spreckels-Mulkey gravel mine, at Fairplay, which was intended to close during C. Mulkey's trip to the Kotzebue sound country, made so satisfactory a cleanup that work will be continued. It is said that 300 carloads paid $4.50 to the man. W. H. Mulkey will manage the property ad interim. The tunnel taps the channel at 450 feet.

Nugget: It is understood that ten additional stamps will soon be put in at the Grand Victory mine, near Placerville.

Democrat: At the Gopher-Boulder development work is in progress; the mill is running on ore from the Gopher. Supt. Husband contemplates extensive operations for the coming summer; water is pumped from the 250-foot level of the Boulder, preparatory to opening operations on that claim, which is operated by electricity from its plant on Rock creek. The mill is run by a 60 H. P. motor. The hoist is run by a 25-inch water wheel; the spent water is conducted into a reservoir and from there used in the operation of the mill.

The *Nugget* says that Salt Lake people have bonded the Lone Star mine at Nashville and are also negotiating for the Havilah and Monitor mines. Work is to begin without delay on the Lone Star.——The Sunrise at Kelsey has been bonded to Eastern people, who have begun work.

Kern.

The Kinyon mine, from a crushing of five tons of ore, received $6500.——The Little Butte is taking out $45 ore.——The output at the Yellow Aster last month was $45,000. The company is said to contemplate putting in power drills, a dynamo and gasoline engine.

Mariposa.

W. Price has bonded the Schroeder mine, near Mariposa, and is pushing development. Last week he took out a piece of ore weighing thirteen pounds, which contained $2000 in gold.

Mono.

At Bodie a test was made of two tons of ore from Copper Mountain that proved a success and active development work will be continued on the property.

Nevada.

(Special Correspondence).—W. R. Chadbourne, Gen. Mgr. Little Johnnie mine, at Leadville, Colo., has been visiting this county during the past four weeks examining mining properties in various sections. He has taken a bond for his company on the Lindsay mine, at Maybert. After making a survey and maps of this property, he has submitted them to his company. The Lindsay has not been worked for a number of years, but has a good record for the time it was in operation under primitive and expensive methods. No depth of any consequence has been reached in this mine. It is favorably located for tunnel operations. Sixteen hundred feet of tunnel will give it a depth of nearly 1200 feet, with water power of over 800-foot pressure. M. D. Conley is developing a property between Washington and Maybert with gratifying results. The German mine, near Washington, which, I am informed, belongs to the Gaston Ridge Co., has been withdrawn from market. Development continues on the Ormonde mine with satisfactory results. At the Eaglebird work is pushed under the new management. Power facilities in this section for deep working are excellent. Maybert is practically in a granite formation. Excepting probably the old Yuba, which reached 800 feet by a vertical shaft, there has been no deep work done in this district, and the company contemplating the reopening of the Lindsay would be the first to do any deep mining by tunnel methods. The Gaston Ridge mine, opened to 700 feet by tunnel, is about ten miles from Maybert in the Graniteville district.

Maybert, April 12th, '98.

(Special Correspondence.)—The St. Gothard M. Co. is pursuing development at N. Columbia through the old Delhi works and meeting with encouraging results. It is reliably stated that they have found an ore body about 70 feet wide of low grade ore, which assays about $2 per ton. The situation is such that the ore can be mined and milled for from 70 cents to $1 per ton. The probability is that a large milling plant will be erected. F. Zeitler is Pres. of the company and F. C. Bigelow is Supt.——The Champion M. Co. at their recent election chose the following officers: G. Kartschoke, Pres.; J. Fetz, V. Pres.; J. Assian, J. S. Schuster, H. Steinegger, J. S. Ott, E. Schuck, directors. F. Zeitler, Supt.; J. F. Holling, Secy.

Nevada City, April 13th, '98.

The Knickerbocker gravel mine, near Nevada City, was purchased at referee's sale by C. Waterhouse for $1500.——The first shipment of ore was made from the Spenceville copper mine. The operators expect to ship 8000 tons this season.——The Grant G. Q. M. Co., who began development of a property adjoining the Idaho, have reached 100 feet depth and 50 feet drift on the ledge. The company is composed of Kentucky people, with C. R. Martin of San Jose Supt.——The Salt Lake Co. that operated in Meadow Lake will resume work in their property, it is stated, in the latter part of spring.——The Fisk gravel mine, near Washington, made a satisfactory cleanup last week.

Supt. Meyers, of the North Bloomfield M. Co., has notified the owners of the mines at Relief Hill and other places in that section who buy water from the Bloomfield Co. that they cannot be furnished with water after the 1st of May. This necessitates the closing of three mines.

C. Pecor, as Mgr., has begun development of a gravel property near Blue Tents.——The Reddik gravel mine, near Nevada City, will erect a 10 stamp mill. G. W. Fletcher of Grass Valley is one of the principal owners.

Placer.

(Special Correspondence).—Near Auburn, Senator Chapman is pushing development on the Three Stars property and making rapid progress.——Opposite the Montauk mine Mr. Chapman is sinking, working three shifts, on the Golden Rule.——Near Forest Hill he is running a tunnel on a property and advancing successfully.

Newcastle, April 11th, '98.

At the Herman mine the main tunnel extends 300 feet to the ledge, thence following the ore body 750 feet, a continuous pay chute averaging 6 feet in width. At least six months' run for the 10-stamp mill remains in the stopes on this level. About 1000 tons are mined in the stopes ready for milling. The company contemplates the erection of a 30-stamp mill to be run by electric power. The generator will be placed on the American river one mile from the mine. Thirty-two men are employed. The mill runs steadily and crushes twenty-five tons of ore per day.

The mines at Weimar are idle, owing to the shortage of water.——Sanders & Co. are working their placer claims on the American river with good results.——Klose & Lozano are taking out good ore near Ophir.——The Pioneer mill at Ophir is crushing fifty tons of ore taken from the Davis ranch.——McLaughlin & Goley are reopening the Centennial mine.——M. Bouk has cleaned and retimbered the old shaft on Big Pine mine, near Auburn. He is sinking through good ore and has reached a depth of 180 feet.——A test run of 100 tons is being made from the Esmeralda mine, near Auburn.——The Mayflower, near Forest Hill, made a test run of 100 cars of gravel which gave satisfactory results.——Sinking in the Maus shaft progresses slowly on account of water to contend with. The shaft is down 190 feet.——The Cash Rock mine expects soon to start its mill.——The Eureka tunnel has reached 2848 feet. Supt. Chappelet expects to start an upraise for the channel within a few days.——In the Evening Star mine a 4-foot ledge was struck at a depth of 65 feet.——C. H. Porterfield is doing considerable development work on his quartz mine near Emigrant Gap. He has run 400 feet of tunnel and the ledge averages 4 feet in thickness all the way in. He has about 12,000 tons of ore in sight, and has completed the erection of a 10-stamp mill. He will soon have his mill running steadily. He is also running another tunnel on a ledge, 14 feet in thickness, in the same neighborhood. Upon this ledge he has a 5-stamp mill, but has been unable to run it, owing to the scarcity of water.

Riverside.

(Special Correspondence).—The Iron Chief property, which is under bond to R. M. Straus and W. L. Shinn, is building a 60-ton per day cyanide plant and a pipe line eleven miles long. This is at Eagle mountain, 140 miles south of San Bernardino.

The Pacific district, forty-five miles east of Salton and thirty-five miles north of the Gold Cross mine, is being developed by shafts on about twenty different claims. The ores are partially free-milling gold, carrying good values. The deepest shaft in the district is 100 feet. A 3-stamp mill is being erected. The Vennita group of five claims is being developed by V. C. Reche and associates of San Bernardino. This group has a shaft 75 feet deep.

The Granite mine, five miles north of the Vennita, has 750 feet of work, and shipped one car of ore which brought $998. The values of the district are mainly gold, though there are some leads of galena. The veins are a contact between porphyry and granite. The district in general is in a low range of hills, surrounded by higher mountains.

Riverside, April 10th, '98.

There are 200 tons of ore on the dump at the Leon mine, near Winchester. The new mill will shortly begin work.

San Bernardino.

(Special Correspondence).—The Stonehammer turquoise properties are located at the lower end of the Death Valley desert. The property derives its name from the number of stone hammers of primitive days found in the locality. Turquoise was discovered here last September. It is found in ledges of decomposed porphyry and bauxite between granite and lime. The ledge is 4 feet wide. The property comprises 500 acres. Surveys are being made at present for obtaining title. The largest piece found in this property to date weighs 210 carats. The greater part of the product is shipped to Amsterdam, where it passes through the lapidary's hands. There are three species of this jewel found here. The first shade, baby blue, is taken near the surface; a little deeper the robin's blue, and deeper down the Persian blue, which is of greater hardness and more value, though the last named is too dark for the American market, and the baby blue is the more popular. Very little blasting is done, most of the work being carried on by pick and shovel.

It is said that a stone weighing 80 carats was found at 80 feet depth in Lincoln county, Nevada, reputed to have been sold for $4000 last September in Denver.

There is also a turquoise mine in Arizona and one in New Mexico. The Stonehammer property is the most extensive thus far discovered.

This jewel is described by Cuninghame Wilson as follows: Massive; comp. phosphorus pentoxide 22.5 per cent; alumina 47 per cent; water 20.5 per cent. Color, pale blue; luster like sealing wax. H.=6; G.=2.75. Dist.: Is harder and bluer than malachite; green feldspar is fusible; turquoise B. B. turns brown and colors the flame green. Occ.: A rare and highly valued gem. It is chiefly found in Persia, and is said to be derived from an ancient trachyte. It occurs in highly disturbed vulcanic regions.

San Bernardino, April 11th, '98.

(Special Correspondence).—The Holcomb Creek M. Co. is developing a property near San Bernardino. A shaft is down 60 feet and a tunnel has been driven 200 feet. The ore thus far encountered is a red quartz and pyrites. Experiments are being made with the possible idea of putting up a cyanide plant.

San Bernardino, April 10th, '98.

Dehm & Luscomb discovered an ore body near Twenty-Nine Palms that yields good assay values.

The Iron Chief mine, recently sold for $150,000, is sinking and drifting. The shaft is down over 200 feet.——A 2-foot ledge has been discovered by L. D. Jensen in Virginia district that assays $60 per ton.

San Diego.

The Hays and Bidwell mines at Poway are producing ore that assays $16 gold and $4 silver.——The Rainbow mine, near Oceanside, is yielding $12 ore.——The Du Quesne Co. has resumed work and twenty men are at work under leases.

Shasta.

In the neighborhood of French Gulch a number of new prospects are being successfully worked.——F. Rossi has started the mill on the Brunswick mine and has a large quantity of ore ready for crushing. It is estimated that sufficient values are out to more than pay for recent development and addition of new machinery.——Wolfe & Wheeler are developing a property in Summit gulch. The ledge is in a contact of slate and diorite, varying from 3 inches to 2 feet. About fifty tons of ore is on the dump, which is estimated to carry $60 per ton in free gold, besides a good percentage of rich sulphurets.——G. Leavitt made a good cleanup on his Washington lease for the month of March. It is expected that the owners of this property will operate it themselves at the expiration of present leases.——Work is progressing favorably at the Gladstone under the supervision of Mgr. Walkotte.——At the Highland Mountain mine, comprising five claims, the company has opened three ledges. Two tunnels are in operation and there are 100 tons of ore ready for milling. This is a new development. The ore is of a good grade, free milling, bearing a good percentage of sulphurets.

Desmond Bros., near Whiskytown, struck a ledge at 135 feet depth which averages $9 35 per ton.——Deveney & Gray discovered a vein at 180 feet.——The Colorado M. Co. continues development with satisfactory results.——The National Mg. Co. is shipping sulphurets.——The Walker Bros., near Old Diggings, have 2500 feet of tunnels and surface work cuts. Their ore body is large and of low grade.——At Middle Creek a shaft 30 feet deep struck a strata of rick gravel. Six men are at work on the property.——Supt. Shepperd has two shifts at work reopening the old Spanish mine near Shasta.——The Mt. Shasta is producing good ore——On the Herron mine development work continues with good results.——J. Driscol opened a paying gravel deposit near Shasta.

Sierra.

Bennaleck & Co. have leased the Phœnix mine at Sierra City and begun work. The mill will be started shortly.

The Sierra Buttes mine at Sierra City is working twenty men and, it is said, will increase the force in a short time.——The Cleveland is running steadily and employing twelve men.

Siskiyou.

Nearly all the large hydraulic mines on the lower Klamath river are in operation. The McLaughlin mine near Salmon Forks is working under a pressure of 250 inches——C. Jilson discovered a vein on his property near Henley.——McGraw Bros. are operating a placer property with success near Ash Creek.——The Vesey Bar Co., below Honolulu, Klamath river, has commenced hoisting pay gravel this week and expect to realize good returns this season.——The Benz Bar Co., at Honolulu, Klamath river, having worked out their old cut from last year, is now constructing a big wingdam covering a large extent of the channel, expected to prove as rich as the section worked last year and early this spring.——The Greenhorn Blue Gravel Co. continues to pay and has a full force working day and night. The company is preparing for an extended run by saving water from channels and springs and by placing pumps in the several shafts and building storage reservoirs.——The river miners on the Klamath are rushing operations to commence hoisting gravel, and a few have already started their derricks. The river being down to the low water mark earlier this season than usual, the work of wingdamming will soon be completed in all the claims, for pumping and hoisting. The yield from river claims during the coming summer and fall is expected to be better than for several years past.

Trinity.

Work will be resumed shortly on the Nash gravel mine, which was closed during the winter.——In the A. B. C. mine at Lewiston a ledge has been found that runs $20 per ton.——Good ore is said to have been found in the Uncle Sam mine at China Flat.

The Indian Creek Hydraulic Co., controlling 200 acres and employing twelve men, are running only about four hands daily on account of water shortage.——The Nash Gravel Mg. Co. is said to have expended upwards of $200,000 in the last two years in adding to the facilities for successful mining.——The Trinity Deep Gravel Mg. Co. has laid 1300 feet of pipe and built half a mile of ditch, but the scarcity of water in Boulder Creek precludes any operations this season.——Peterson & Hovie discovered a ledge near Trinity Center that is from 6 to 9 feet wide that yields $8 exclusive of sulphurets.

Tuolumne.

(Special Correspondence).—The Dreisam group, consisting of the Yellow Jacket, Ophir and Good Luck mines at Arrastraville, is owned by the Dreisam G. M. & M. Co., incorporated under the laws of California; principal place of business, San Francisco. This is the only property under the same management as the Dutch mine at Quartz mountain, notwithstanding the reports that other mines are backed by the same people. Since the present owners obtained control, a steam hoist with a capacity for 1000 feet has been put in operation on a 60-foot shaft, in which sinking was resumed; it is now 95 feet deep and shows a 14-inch vein of good pay ore. An old incline shaft 240 feet deep has been drained, and sinking is also in progress. At the bottom a 22-inch vein showing free gold and a large proportion of sulphurets, is being opened. A 3-stamp mill with complete equipment is being erected and a compressor has been ordered, all of which when installed will run by steam power.

Soulsbyville, April 11th, '98.

The tunnel in the Three Friends mine, near Confidence, is in 70 feet. The ore averages $10.90 per ton.——The *Democrat* reports the finding of rich ore in the North Star mine near Sonora. The vein averages 3 feet.——Sulphuret ore has been found in the Gagnere mine at Tuttletown, a five pound test of which yielded $21 in silver and $37.52 in gold.——The Golden

Crown Co. is developing a property on the East Belt on the line of Tuolumne and Mariposa county, in which the ledge at 200 feet is 10 feet wide. When the shaft reaches 300 feet a mill will be erected.——Wemple & Hilbish of San Jose are the principal owners. The tunnel in the North Star has reached 680 feet. The ore body is said to be large, milling $16 per ton.

Yuba.

At the Davis mine, near Hansonville, the mill is running on good ore.——Thurston Bros., near Woodville, are crushing ore and report fairly good returns.——Spangler Bros., near Strawberry Valley, crush a fair grade of ore from a 20-foot ledge. The capacity of this mill will be increased this summer.——A new mill is to be erected on the Berry claim.——W. Wolf is operating a two-stamp mill at Dobbin's Ranch.

NEVADA.

(Special Correspondence).—J. Meehan of Jackson, Cal., is developing a property near Charleston. The tunnel has reached 300 feet, and is on the ledge, which runs from 4 to 6 feet and assays $23.56 per ton gold. There is considerable ore on the dump. Mr. Meehan says he will put up a mill in July.

Charleston, April 8th, '98.

The cyanide plants at Aurora will soon be in operation. That at Sunshine has started work.——Near Mountain City ore has been discovered that resembles the phonolite ore of Cripple Creek. The ore body is a dyke 100 feet wide. The lowest assays yielded forty-seven ounces silver and $6 gold.——At the Ione mine, near Austin, thirty stamps are in operation. Gen. Mgr. Farnsworth contemplates adding ten stamps.——The finding of good ore is reported in the Pueblo mine, near Winnemucca.——The Jump-Off-Joe mine struck a ledge 3 feet wide, the ore assaying $15.——At the Virgin mines there are 250 tons of ore on the dump said to be of good value. ——The New York Dredge Co. has located three miles of river bed at Garnet. They will build a 120-foot boat for the initial operations, to be followed by more if operations prove successful.——J. H. Perry is meeting with success in his placer mines near Garnet.

The following ore shipments were made over the E. & P. railroad for the week ending April 8: Excelsior mine, 30,470 pounds; Eureks S. Works, 52,500; Jackson, 35,290; Richmond, 71,590.——J. H. Rea has leased the Rock Point mill at Dayton and also the Franklin property, to test low grade ores of that locality.——The De Lamar and April Fool mines at De Lamar are handling 330 tons of ore per day; thirty tons are accredited to the latter.——The Dexter mill at Tuscarora made a $2400 shipment of cyanides ——The judgment of the District Court in the water suit between the April Fool M. Co. and T. E. Dula has been affirmed by the Supreme Court. This suit was tried in Dec., 1896, and, awaiting the final result, little or no work has been done on the Dula claims, which will be shortly resumed now.

Comstock official letters say: In the Belcher mine on the 1200-foot level the north drift from the east crosscut is now in 145 feet. The face is in low-grade quartz. The east crosscut from the north drift on the same level is out 52 feet. The face shows porphyry. On the 850-foot level the joint Belcher and Crown Point west crosscut from the top of upraise No. 1 is out 22 feet. The face is in quartz giving low assays. There were hoisted during the week fifty-three mining carloads of ore, the average car sample assay of which was $18.92 per ton.

In the Savage M. Co.'s ground on the Comstock lode, on the 130-foot level, the main west drift has been cleaned out and repaired a distance of 15 feet; total length, 488 feet. Brunswick lode—The main north drift, 600 level, was advanced 10 feet; total length, 437 feet; face in porphyry and bunches of low-grade quartz. Incline shaft No. 1 has been sunk a distance of 11 feet; total depth, 1181 feet; bottom in hard porphyry.

In the Chollar mine they have placed one set of timbers in the main incline during the week below the 1100 station and are still repairing this incline. They have stopped the west crosscut on the 100 level 60 feet north of the south line and have started an east crosscut opposite it, which is out 12 feet. On the tunnel level the west crosscut 60 feet north of the south line has been advanced 8 feet; total length, 32 feet; face in porphyry and quartz, the latter assaying $20 per ton. In the Chollar Company's ground on the Brunswick lode, incline shaft No. 1 was sunk 11 feet during the week turough hard rock; total depth, 1181 feet on the slope. 200 level—Are saving a few carloads per week of good ore from the streak above this level. They are repairing various places throughout the mine. The electric blower and lighting plant is in operation, and is a success—both in lighting and for running the blowers on the 500 level.

In the Potosi mine on the tunnel level, the joint Bullion-Potosi south drift was advanced 21 feet; total length, 620 feet; face in porphyry and low-grade quartz. It has about 87 feet to go to connect with the Crœsus shaft. The joint repairs by the Bullion-Potosi companies on the Crœsus shaft have been completed for 225 feet. Brunswick lode—Incline shaft No. 1 has been sunk 11 feet for the week through hard rock and is now down 1181 feet on the slope. The main south drift has been driven 23 feet; total length, 281 feet from the north line. The face is in prophyry and low-grade quartz. The hanging wall is in sight on the east side of the drift.

OREGON.

Near Baker City G. & P. Howard from thirty-seven tons of rock netted $1500 in gold. ——At Granite the Boston is pushing development with eight men.——At the Bunker Hill and Ajax properties development continues with satisfactory results.——The Cliff mine is having 100 tons of ore crushed at the Virtue mill. The Collateral mine is delivering 100 tons of ore to the same mill.

Near Henly, in the California Queen mine, after two weeks run of a 5-stamp mill Roberts & Co. netted $2000. This property had been abandoned for fifteen years until a few months ago. The present company has run a tunnel 520 feet. They found a 7-foot ledge of fair grade ore. They contemplate adding an 8 H. P. gasoline engine and making other improvements.——R. D. Chumley struck a ledge of good ore near Baker City.——The Climax, in the same neighborhood, is showing satisfactory results.

At Alicel, G. W. Ruckman contemplates placing a dredge this summer and doing extensive river mining. He states that dredges will also be used on the Snake river properties, owned by P. Basche of Baker City.——The Flagstaff mine, near Baker City, operated by a French company, of which M. Imhaus is agent, will make extensive improvements and additions in its machinery plant. The mine is said to have produced $100,000 last year.——The shaft on the Comstock, in the same neighborhood, has reached 100 feet and is producing fair grade ore.

WASHINGTON.

At Bossburg a new ore body was discovered in the Bonanza mine of good values.——In the Scotia a ledge was discovered that averages $38 per ton.——Assays from the new find in the Tom Thumb mine at Republic gave returns of $12 per ton. The ledge is 7 feet wide.——The Pierre Lake and Flat Creek M. Co. have resumed work. The work on one of the properties is in ore said to run $40 per ton gold with a fair percentage of copper. The company owns 120 acres.

In the Conquest mine near Newport ore has been struck that averages $56, carrying gold, silver and copper. The mine is shipping ore. ——The Rebate mine at Republic, bonded by J. M. Burke, has begun development. The San Poil ledge is widening and the values run from $20 to $30 per ton.——Near Meyers Falls, Black & Carmichael have a 10-foot ledge from which $30 assays were taken.——The Mohican at Flat Creek, in the Colville Reservation, was sold to New York people for $20,000 cash.——In the Republic the ore chute continues from 4 to 8 feet wide and the average daily ore values are from $100 upwards. ——The Everett Hydraulic G. M. Co. near Everett has begun work on their property, employing forty men.

F. Raberg bought the Monroe mine at Republic for $5000, of which 10 per cent was cash, the balance in thirty days.——W. Kane sold the Princess Maude mine for $5000.

BRITISH COLUMBIA.

The output of the Le Roi mine increased during March to 200 tons per day. The shaft is down 750 feet. Drifting on the vein at that level is in progress. The winze on the 600 level is down 40 feet, in ore all the way. The smelter is running 200 tons per day.——The Idaho at Slocan is taking out forty tons a day.——A 6-inch vein was struck in the Whitewater Deep at a depth of 1000 feet.—— The London & B. C. Goldfields Co., whose office is in Nelson, will build a 40-stamp mill on their mine at Ymir.——Near Quesnelle Forks large placer mining operations are carried on by the Golden River Quesnelle Co., Ltd., of London, with a capital of $1,750,000, of which $400,000 is paid up. The company has secured the right to mine the South Fork of the Quesnelle river for seven miles. The company has employed from 400 to 500 men excavating a waste weir to divert the waters, with the necessary gates, nine in number, each 12½ feet wide in the clear, with a lift of 19 feet in extreme flood water. The dam is thrown across the river with a curve, one end against the bulkhead, the other against the rocky left hand bank; the river at this point is about 400 feet wide. This dam is intended to hold back the waters of Quesnelle lake, which cover 140 square miles. The water in the lake has risen every season before the dam was put in from 8 to 10 feet above low water mark, while at the lowest stage the water in the river is from 6 to 8 feet deep. It is estimated this work will cost about $300,000.

ALASKA.

The Mellen M. Co. is developing the Ivanhoe group, comprising five claims at Berners Bay. The company is composed of Indiana people and is capitalized for $300,000. B. F. Von Behren is Pres., W. H. Mellen and H. F. Hoggatt are local managers. Several hundred feet of tunnelling has been driven, exposing two ledges containing from 6 to 10 feet of ore. The Berners Bay M. & M. Co. and the Nowell G. M. Co. will both resume operations soon. The Sumdum, Ketchikan, Snettisham, Funter Bay and Silver Bow Basin will soon be actively at work. Development is planned on the newer discoveries of these localities and the building of mills on some of them has been decided upon. It is said that much attention is given to Southeastern Alaska and new development work has already begun.——The Alaska Commercial Co.'s mine Apollo at Unga shipped $75,000 to San Francisco. The following report on the property was made by T. C. Mayon, the Supt.:

After seven years' work we have the Apollo ledge thoroughly prospected and have done a large amount of developing. The main tunnel is 2600 feet in length. A shaft 400 feet in depth has been sunk at a point 500 feet from the mouth of the tunnel. The value of the ore varies to a great extent, but that which has been taken out this winter is richer than ever. The mouth of the main tunnel is a mile back from salt water, but a wire rope tram covers the distance. The ore is taken out of the deep shaft by complicated hoisting machinery. The ore is handled by a 40-stamp mill and the concentrates are smelted at the mine. The bullion is sent down on the Alaska Commercial Co.'s ships, which are about the only ones calling at Unga.

There are 125 men working for the company at Unga. They get $3.50 per day and really get along better than one would imagine in such a lonely, desolate place. We see hardly any one from the outside during the winter and very seldom get any news from the outer world. Steamers for St. Michaels do not come near us, and we are too far west for the Copper river boats. We always have plenty of supplies and the men have as good a time as possible among themselves. Some of them have been there a long time. Many stay but a few months. The output of the Unga mine runs from $15,000 to $45,000 a month.

The Van Anda C. & G. Co. of 65 Wall street, New York, will erect a smelter with a capacity of fifty tons per day. The company has ten properties.

THE KLONDIKE.

Among the few high priced experts who went to the Klondike were Aug. J. Bowie of San Francisco, whose articles on hydraulic mining in the MINING AND SCIENTIFIC PRESS have given him world-wide fame. It is understood that Jas. R. Keene, now of New York City, paid Col. Bowie $25,000 and expenses for a year's sojourn in the northern El Dorado. With him last July went Alf. Tregidgo of Nevada county, and two other old California miners. By the last mail from Dawson City comes a letter from Tregidgo telling of the latest strike on Arkansas creek. It appears that Bowie and he started a stampede from Dawson. Tregidgo says:

February 22nd, with Friend and Lawson five quick dogs and a sleigh I started for Dominion creek, on a branch of which, twenty-five miles down, called Arkansas creek, good gravel had been struck. It was 6 A. M. when we started. We made a roadside house at the summit of Hunter creek, twelve miles distant, at 7:50 o'clock. We crossed the divide by upper discovery, on Dominion creek, forty-two miles from Dawson and remained for the night. At 4 the next morning we were off again, and made the place at 2:30 o'clock that afternoon. I staked No. 7 above for myself and No. 6 for Augustus Bowie, both of which, I think, are good claims. Mr. Bowie was to leave on the 24th and meet me on 28, below upper discovery, Dominion. Made a rapid trip back to No. 30. I remained the night, expecting Mr. Bowie on the following day. We have purchased No. 28, and as all the claims on Dominion creek are remarkably good, I think we have a fortune in No. 28. We are sinking there but are not yet down to gravel bed. In No. 30, which is only 165 feet south from 28, they have from 3 to 5 feet of gravel, all good for 15 to 40 cents to the pan. This has been opened for a width of 120 feet, and on the bedrock every pan of dirt is worth from $2.50 to $30. On No. 31 they have stripped the bedrock for 51 feet in width, and are averaging over $5 to every pan of dirt they take out. On No. 32 some young fellows from Alameda are working a lay for a year, getting 75 per cent of all they take out. Nos. 33, 34 and 35 are equally good. Fifty thousand dollars a piece would not buy these claims. No. 31, $250,000 would not buy. When I was here before, in December, I could have bought for $10,000 property that is to-day worth $500,000.

On No. 9, above lower discovery, and Nos. 6 and 2, below lower discovery, the dirt is worth as high as $34 to the pan. On Dominion creek the gold is beautiful, much better than I have yet seen on the Klondike—clean and fine, and worth, I should judge, over $18 an ounce. There are 280 claims located below lower discovery, and down as far as 75 below gold has been found in great quantity. Twelve thousand dollars was offered and refused for No. 76. There are 300 men on the creek now, and the trail from Dawson to the end of Dominion is alive with men and their outfits going out to represent their claims. The law here demands that each owner of a claim shall work it ninety days consecutively each year. This is called "representing." I am sure Dominion creek will equal, if not excel, the famous Bonanza creek. The latter creek is staked to 88 above and 118 below discovery, while Dominion is staked 38 above upper discovery and 36 below, and 14 above lower discovery and 280 below lower discovery. Thus there are 206 claims on Bonanza creek, and 316 on Dominion creek, each claim being 500 feet in length. Of course, both creeks have several ravines or "pups" running into them, all of which are fully staked.

On Dominion a "pup" comes in 28 below upper discovery, called Caribou. Another, at 25 below lower discovery, called Arkansas. On this I have No. 7 above discovery and a large one at 171 below, on which there are more than 200 claims staked. Everywhere they have got down to the ground gold is found in quantities.

I was more than surprised at what was brought forth by sinking the four holes at present on the creek. These holes vary from 25 to 8 feet in depth. The gravel is from 3 to 7 feet deep under the muck. On Friday afternoon Mr. Bowie arrived. We remained over night on No. 30, and the following day made an inspection of the creek between the two discoveries. Mr. Bowie was well pleased with what he saw.

On our return we went into Alexander's cabin, on 31, and panned out some of his gold. We got $4.50 in one pan and $6 in the next. Mr. Alexander had a fruit can half full of gold from his panning since he struck the gravel. Of course, he is greatly excited over his property, and why should he not be, as to either sell his claim or work it will insure him a large fortune. On 28, our mine, we are building a cabin, which is nearing completion. We told our men where to sink their holes, and the following morning started for Sulphur creek.

At the bottom of this last descent we came to claim 62 above discovery on Sulphur creek. Here some one had left a tent and a stove. Here we met Messrs. Pond, Fairbanks and Whitney. Sulphur creek, like Dominion, is being rapidly developed. On claim 2 above, belonging to young Pond (ex-Mayor Pond's son) and Fairbanks, they have struck it rich. On 13, 14 and 15 above discovery, and on 6 above and as far down as 45 below, good prospects are found. The same lively condition prevails as on Dominion, and undoubtedly Sulphur will prove a great gold producer. We have No. 3 above, and, to be sure, this is a grand property. Sunday night we slept in a cabin on No. 13, owned by Mr. Kane. We gave such instructions to our men as were necessary, and on Monday started up the canyon again. Ascending the steep mountains we had to double up, *i. e.*, hitch all the eight

On May 20th the Johnson=Locke Mercantile Company will dispatch from San Francisco the Steamer "Tillamook" for Dutch Harbor, Nunivak Island and St. Michaels.

This will be the First Steamer Sailing this Season for the North. The At=tention of Owners of River Boats Outfitting at Dutch Harbor or Nunivak Island is Called to this Early Departure. As the Space on the "Tillamook" is One=Half Engaged, Early Application for the Remainder is Necessary.

The "Tillamook" will Also Connect at St. Michaels with River Steamers for Dawson, and the Opportunity for an Early Trip up the Yukon River is thus presented. Apply to the JOHNSON=LOCKE MERCANTILE CO., 609 Market St.

dogs to one sleigh, and after they reached the top of the steep place come back for the other. At last we reached the last dome and descended down the mountain side into Bonanza creek, striking it at claim 61 above discovery. We reached Mr. Byrnes' cabin at No. 35 above at 7 P. M. Tuesday, March 1st, we started out for Dawson. From 47 above discovery on Bonanza creek clear down to 86 below, a distance of eighteen miles, is one continuous line of cabins and shafts. At each shaft there is a large dump of gravel awaiting the summer and water to be washed.

At 8 above we struck the junction of Bonanza with El Dorado. At the latter creek the richest dirt in the country is being found. They are taking out from Nos. 4, 5, 6 and 10 dirt worth over $100 to the pan right along, and all the other claims from 1 to 37 have good big pay. It is estimated that the Berry boys will come close to $750,000 this year from 4, 5 and 6, which they own, and No. 10 is reported to be even richer. Over $4,000,000 is expected from El Dorado creek this season. We are interested in No. 19; 17 and 18 will take out $250,000. On Bonanza $2,000,000 to $3,000,000 will come out, and from Hunker, Dominion and Sulphur at least $5,000,000. Some put the season's output at $15,000,000.

We reached 61 below on Bonanza creek. Then we went to No. 97. We reached Dawson at 5:30 P. M., tired out, but much satisfied with our trip. Friend's bill for himself and dogs for six days was $400. The thermometer now is 8° above zero. The day is warm. The northern lights at night are something grand, like a transformation scene at the theater. The town is dull and will be until they commence washing. When they commence washing the gravel they have been extracting all winter, and gold will flow like water. At present dust is scarce, as so many have gone out over the passes, and the saloons and stores have taken in the remainder; but those who have good claims—and their name is legion—can borrow all they require to spend at rates varying from 5 to 10 per cent per month, payable when they wash out.

All private mail that goes out costs $1 a letter; penholders, 50 cents; nibs, 25 cents; paper cannot be bought at any price; nails are scarce at $5 a pound. One man, who has twenty pounds of No. 12 nails, expects to get $1000 for them before the steamer comes in. The way they distribute mail here is peculiar and awfully slow. Day before yesterday there was a sign over the postoffice door, "All letters will be delivered to-day to persons whose names commence with A to K; Saturday from K to the end of the alphabet."

The Government has decided to establish the Yukon headquarters of administration at Fort Selkirk, where the Lewes and Pelly rivers join to form the Yukon. Fort Selkirk is 200 miles up the Yukon from Dawson City. It commands the route of ingress to the territory of the gold district by the rivers named, as well as by the Stewart and MacMillan, and there the protected bank will be established.

The steamer Islander from Skaguay brought 200 passengers a large number of whom lost partners and outfits in the recent dreadful avalanche on the Chilcoot Pass. Dr. L. Goeschel, who assisted in the rescue, said: "I believe at least 125 bodies will be recovered before the work of rescue is complete." Traffic over the trail has been suspended while the search for bodies is in progress. P. F. Greene says twenty-two men of the Chilcoot Transportation Company were caught in the first slide and were returning to Sheep Camp when they were caught and lost their lives in the big one.

The Alaska Exploration Co. has letters written between Feb. 15th and March 1st from L. R. Fulda at Dawson City. He has visited all creeks where the placers are worked, and speaks authoritatively after a close examination. He says that the output of gold for the winter will be large, considering the small force at work, and he predicts that the first boat out will carry a large sum of money. The general estimate at Dawson is that $15,000,000 in gold will be taken out this winter. Claims that sold for $2500 in November were held at from $50,000 to $80,000. He saw eight pans taken from three new holes on claim 6 that panned $139.80. The pay streak had proved to be 2½ feet deep and 100 feet wide. On claim 13 the gravel was paying $46 to the forty-pound pan. The prices asked for claims on Dominion, Gold Bottom and Sulphur were ridiculously high, and could only be had for spot cash. Upper Bonanza was yielding beyond expectations. On Sulphur two men in one day took $237 from claims 5 and 6. On No. 6 on Dominion $139 was brought up in one bucket, and the owners were asking $160,000 for the claim. A half-interest in claim 43 on Hunter sold for $30,000. Stampedes from Dawson were of frequent occurrence and upon the slightest rumor of a strike. Chief Creek had not turned out well, but Nine-Mile creek was the scene of the wildest excitement. The entire creek had been staked, and big prices were being asked for even speculative claims. The scarcity of food had retarded the prospecting of the outlying creeks, and the weather had been very cold, the thermometer falling below 60 degrees.

Provisions and labor were very high. The services of a man and team commanded $75 a day. Candles cost 35 cents apiece, and kerosene $20 a gallon.

Much wildcat property, for which big prices had been paid last fall, had turned out well, and in consequence all claims were held at stiffer figures. Quite a number of owners were doing so well that they would probably draw out if they could sell for a good price. As much as 10 per cent a month was paid by some borrowers for loans on good mining security.

IDAHO.

The Bingham Placer Co. will begin operations at Gibbonsville within twenty days. The same company will resume development of a quartz property in the same neighborhood. ——Extensive hydraulic operations will be carried on near Florence. The property comprises 400 acres. J. C. Meinert & Co. of Florence are the owners.——At Hailey the Golden Star mine has an ore body 13 feet wide that assays $47 per ton.——Mills will be erected this summer on the Tip Top, Capt. Lusk, Supt., and on the Golden Star. The Moscow is developing a ledge of fair-grade ore.——C. H. Bogue has begun work on his hydraulic mine near Warrens.——Work will be resumed on the Checkmate mine at Willow Creek.

The Crœsus and Hope mining properties at Hailey were consolidated last week.——The output of the mines in the Cœur d'Alenes in 1897 was $9,000,000.——The Montana D. Co., that purchased properties at Placerville, has bonded additional acreage and expects to employ 100 men this summer.

Three hydraulic monitors have been added to the Twin Springs mine near Idaho City, making a total of five in operation.——Brown & Reddy of Spokane, in their mine near Hope, contemplate placing a $1500 hoisting engine. Narcoe & Co., near Hailey, are shipping a carload of concentrates a week from the Minnie Moor tailing dump, of which there are about 200,000 tons.

UTAH.

Work has resumed on the Orient mine at West Tintic. The shaft has reached 100 feet. ——At the Savings Bank mine copper ore of good value has been discovered.——The Bertha is making regular shipments.——The Sioux-Ajax tunnel at Mammoth has reached 4300 feet.——At the Undine, near Silver City, drifting is done from the 200 level.——At the Cornucopia a good ore body has been opened. ——The Sunbeam is producing ore of fair value.——In the Martha Washington native silver has been discovered.——The South Swansea at Tintic marketed during the year 4222 tons of ore, from which was derived $103,602.17; the dividends paid were $52,500; the balance on hand is $5,797.28. The property began paying dividends fifteen months ago, since which time it has paid $82,500. The main shaft has reached 724 feet.——The Grand Central M. Co. purchased the Wedgewood and Six Shooter claims for $50,000 cash.

The Niagara Co. at Bingham is marketing 1000 tons of ore per month. The Last Chance mine is crushing 100 tons daily. Ten tons of concentrates are derived, which yield 66 per cent lead and 45 ounces of silver per ton. The company has 200 acres of ground, and the ore bodies are large. The Stewart is being extensively prospected through four tunnels. At the Grizzly mine near Alta there are 100 tons of ore carrying copper and silver. The same amount awaits shipment at the Vallejo.

The output of Grand Central at Provo averages twenty-five tons of ore daily that carries gold, silver, copper and lead.——The Sacramento at Mercur is outputting 100 tons a day. ——Assays from the Rosa return 56 per cent lead and from thirty-two to forty-nine ounces silver per ton.——The total output for March from Bingham is 4097 tons.——At 650 feet depth the Antelope struck a 12-inch streak which is widening in wedge shape and assays 51 per cent lead, twenty-nine ounces silver and $5.25 gold.——The *Tribune* says the Centennial Eureka will erect a new mill with which to prepare its low grade ore for market.——The Marsac mill at Park City will work the Ontario tailings.

The South Swansea shipped six cars of high grade silver and lead ore.——The Mercur people will begin development on their property at Manning.——The Sterling Coal Co.'s tunnel has reached 1600 feet, with 500 additional to be run under present contract.——The Fortune M. Co. at Bingham shipped three cars of ore, in one of which copper predominated. In the others silver and lead were the principal metals.——The Lower Mammoth at Tintic will sink another 100 feet, which will give it 650 feet from the surface.——A strike of ore is reported from the Norway at Eureka.—— The May Day will extend their tunnel 800 feet farther in their Tintic property.——The Ophir Hill Con. Co. contemplates an additional plant to work their crude ore and the accumulated tailings. They calculate the latter to net $3 per ton.——The Geyser-Marion made a $5000 cyanide shipment.——The Mercur made a semi-monthly shipment of cyanides valued at $24,000.——The Columbia M. Co. at Mercur reports a new ore body of good values.——The Mignon at Manning made a strike of good values.

Work will be resumed shortly on the Deer Trail group at Marysvale.——The Sunday claim has developed a body of carbonate ore. ——The shaft on the Rabbit's Foot has reached 300 feet.——At the Four Aces a 6-inch streak of argentiferous lead ore has been discovered.——Assays at the Cornucopia show 190 ounces silver and $16 gold.——A steam hoist is to be erected on the Martha Washington.——The International, at West Tintic, at 250 feet struck a 12-foot ledge of steel galena.——The Dexter made a $2500 cyanide shipment.

The Yuba, at Bingham, discovered a 2-foot ledge of sulphide ore that returns 22 per cent copper, twelve ounces silver and $14 gold per ton.——The Florence M. Co., at White Rocks, struck a ledge that assays $35.20 in gold per ton.

MONTANA.

C. F. Buckley of Kalispe is doing extensive development work on his Yahk claims.—— G. Hathaway is pushing work on his copper claim near Libby.——At Sheridan a mining case, entitled McKay vs. Noble, occupied the attention of the court, the facts of which are as follows: Knight Bros. and associates discovered mineral on the lower end of the ground in controversy Aug. 27th last and put up a location notice to that effect. They did not do the location work at the time. Aug. 28th Noble and partners discovered mineral on the upper end of the disputed ground and dug a cut 10 feet to record the property and set their corner stakes. Later they began work lower down, running a tunnel and crosscutting. Before the time for doing the location work had expired, Knight Bros., who in the meantime had disposed of an interest in the claim to K. McKay, returned to do the work. They found the Noble faction at work and the lawsuit resulted. Fifteen witnesses were examined when Noble's attorneys asked that the jury be excluded from the room, as they wished to argue a point. At the conclusion of the argument the jury was recalled and instructed to find for the defendants, the judge holding that they were in the right, inasmuch as their corners were the first in position.

In the Bonanza mine, at Walkerville, the finding of a large ore body is reported. The property is under bond to the Montana O. P. Co. The strike was made on the 600 level.—— The Sapphire mines at Yogo will be extensively operated this season by hydraulic methods.——The Banner mine, near Argenta, is shipping ore.——The Hecla Con. smelter at Glendale is in operation.——Anderson Bros. of Bozeman contemplate erecting cyanide mills on their low-grade properties near Livingstone.

Another mining suit was instituted in the U. S. Court in Butte by the Anaconda Co. against the Colusa-Parrot Co., owned by W. A. Clark, to enjoin the defendant from following beyond the side lines of its claim, the vein claimed by the Anaconda Co. The suit involves untold values and a Federal question as to which company is entitled to the ore.

An average of six carloads of ore are shipped every week from Norris.——Two and a quarter cars from the Columbus mine yielded $170 per ton.——A shipment from the Galena returned $118 per ton.——In the Louise an ore body was struck that runs upwards of $100 in gold per ton. Judge Duncan, the proprietor, contemplates sinking to 500 feet depth and adding adequate pumping facilities.——Doney & Co. contemplate placing steam hoisting machinery.

SOUTH DAKOTA.

The production of the Wasp No. 2 mine, near Black Hills, last year amounted to $182,000.——H. B. Swain discovered a 4-foot ledge near Preston that assays $30 per ton.——From a five days run at Oreville the St. Elmo cleaned up fifty ounces of amalgam.——The sale of the Ore Cache mining claim, near Deadwood was made by Sheriff Plunkett, to satisfy a judgment on foreclosure in favor of J. H. Carstairs of Philadelphia. The amount of the foreclosure was $95,747.33 and the property was bid in by Mr. Carstairs, as trustee for a Philadelphia company.——Near Two Bit was discovered an ore body that runs 40 per cent lead and $10 in gold.——The shaft on the Deadwood M. & D. Co. has reached 175 feet. The lime shales found in the shaft assay $17.20 per ton and the sand shales $12.80.

MICHIGAN.

E. Roberts has closed a copper deal for a property on the Lake Superior zone about thirty miles from the Calumet & Hecla for $2,500,000.

COLORADO.

The output of the Wolftone at Leadville is 1800 tons of ore per month.——The Lucky Gus at Cripple Creek produces mill ore running two ounces per ton, and a shipping grade that goes ten ounces gold per ton.——The Lafayette, at a depth of 400 feet, cut into a 6-inch seam of ore that yields $35 a ton.——In the Pinto a pocket of sylvanite was found at the 350 level that assayed $1000 per ton.——The Ridgeway at Silverton produces a carload of ore per week that yields $180 per ton.——The Gold King is producing a good grade of ore and making weekly shipments of concentrates.——The M. E. Harrison will be reopened this summer. The mineral is sulphide of lead and copper, carrying some gold and silver.——The Smuggler-Union at Telluride is producing 175 tons of ore per day. The new California canvas tables in use prove satisfactory in saving values from the tailings.—— The Last Chance mine, in Wall St. camp, made a fifty-ton shipment of high-grade ore.

The Lalla Rookh property at Eldora is producing ore that runs from $27 to $40 per ton. ——The Poor Woman mine is in mineral that runs $16 per ton in the stamp mill, while the smelting ore runs from $50 to $100 per ton.—— The Denver *Mining Review* says that Judge Allen of Arapahoe county has dissolved the injunction placed on the Running Lode M. & M. Co., after having been in force for six years. This removes from the records of the county a matter which might have caused considerable litigation, and leaves the English investors who recently purchased the Running Lode group of veins from the old company without any cloud hanging over their title. The company is now in possession of the property and have already commenced preparations for further development work. ——The shipment of smelting ore and concentrates from Black Hawk for March amounted to 350 cars of seventeen tons per car.——Considerable ore is being shipped from Russel district to Idaho Springs.——The Kansas Con. mines in Gilpin county sent to the custom mill at Black Hawk last month 2800 tons of ore.—— The Nellie mine at Telluride has come into new ore and of high grade.——The Gilpin & Cripple Creek G. M. Co. secured under lease the Roanna and Atlanta claims on Bull Hill for eighteen months for $60,000, of which between $5,000 and $10,000 was paid cash. The property comprises nine acres.——At Leadville the Neptune mine is shipping two cars of iron ore daily.——The Boreal is shipping a good grade of silver-iron from the 250 level.——The Gallagher is hoisting eighty tons per day of iron sulphides from the 1150-foot level.——The La Plata is shipping carbonate ore carrying fifteen ounces silver and 25 per cent lead.——The Silver Queen at Lake Park opened a streak of mineral that samples 165 ounces silver, 3½ per cent copper and one-half ounce gold.——During March there were shipped from Creede 700 carloads of ore comprising 11,900 tons.——At Eldora a 2-inch vein of sylvanite was opened in the Liberty Bell.——Uranium is reported to have been discovered near Idaho Springs, and specimens have been forwarded for analysis. ——The net proceeds of the Ridge mine at Creede since last June were $36,000. The ledge is 6 feet wide and consists of good grade pure lead ore.

The annual statement of the Gold Coin Co., one of Gilpin county's chief producers, is out. During 1897 the output of ore was 37,797 tons. Of this 1238 tons was smelting ore, worth $71.81 per ton, and 30,559 was graded as milling ore, averaging $6.51 per ton. The cost of mining reached $5.55 per ton, milling and kindred charges $1.36, mint and smelter deductions 90 cents, making the cost per ton $7.81, which left a net profit of $1.24 per ton. Mill charges ranged from 88 cents to $1.11 per ton. Receipts from ore sold and milled footed up $287,849. Total costs footed up $248,236, leaving $39,613 for net profit. The sum of $10,000 was paid for new property. Following are the details of cost: Breaking ore and tramming, per ton, $2.88; hoisting, 43 cents; general mine account, 17 cents; general expenses, 46 cents; taxes and legal expenses, 14 cents; general repair account, 12 cents; Keystone lease, 1 cent; drainage, 34 cents; prospecting and dead work, $1; total, $5.55.——The Wisconsin at Cripple Creek shipped thirty tons of screenings that returned $50 per ton.——The Legal Tender production for March will reach 2000 tons. Sinking has been resumed at 550 feet.

The Banty mine, near Idaho Springs, at 200 feet depth, struck an ore body in which the smelting streak is said to measure 3 feet.—— The Abe Lincoln at Cripple Creek, on which work was resumed about three months ago, on the 300 level, came into ore measuring from 2 to 4 feet which runs from $80 to $100 per ton.——A new strike was made on the Pharmacist. The first carload consisting of ten tons yielded $50 per ton. There are two feet of ore in the vein.——The output of the Fluorine is from fifteen to twenty tons per day, and runs from $30 to $40 per ton.——At Woodland Park a new strike is reported in the Lacey mine of a 2-foot vein of high-grade ore.——M. Moffat struck a ledge near Cottonwood that measures from 7 to 15 feet and of good grade.——Both the Mollie Gibson and Free Silver pumps have shut down and are under 20 feet of water. The Mollie Gibson took the initiative. When the Smuggler took charge of the pump on the first of the year, it was attempted to form a pumping company to divide the expense of handling the water in the Free Silver, Smuggler, Mollie Gibson, A. J. and Della S. It is claimed that the Mollie Gibson declined to enter such an agreement. The Smuggler declined to handle 1800 gallons of water per minute, thereby draining the Mollie Gibson to 600 gallons per minute, and decided to abandon all workings below the ninth level. Many theories are advanced to explain the action of the Mollie Gibson Co. A short time ago a body of high-grade mineral was uncovered in the thirteenth level of the Mollie Gibson. The strike was kept from the public, and not until the level was under water did the details come out. It is claimed that this ore body is exposed over 400 feet. It has been operated upon 70 feet and crosscut 60 feet, the upraise and crosscut still being in ore. It runs in value from 100 to 460 ounces in silver. In explanation of their action the Mollie Gibson people say that they have decided to concentrate their output, and have sufficient ore for this purpose above the tenth level to keep their mill in operation five or six years.

The El Paso, at Cripple Creek, is shipping twenty tons of ore daily.——The Snoofly shipped fifteen tons which yielded one ounce per ton.——The McKinney is outputting an average of twenty-two tons per day averaging $50 per ton.——The Burch is shipping fifty tons per week. A carload of second grade ore netted $80 per ton whilst the high-grade shipped yielded eleven ounces per ton.——The Hawkins is marketing a car a week that runs $50 per ton.——The production to date of the Santa Rita is about $100,000.——The output of the Gold Coin, at Victor, averages ninety tons per day of $22, netting about $45,000 per month.——The Fluorine lode shipped 4412 tons of average value of $61.20 per ton.

The Lilian-Leland shipped six tons of ore. At 60 feet depth the ore is 12 inches and assays from $60 to $120 per ton.——The Hillside marketed eleven tons that ran from $20 to $360 per ton.——The Moon-Anchor shipped 120 tons of first-grade ore.——The Porcupine shipped one and one-fourth tons of $320 ore and three tons of $265 per ton.——Returns from the last shipment on the Gold Sovereign returned $89 per ton.——Orpha May shipped ten tons that returned $1277, of which three tons ran $290 per ton.——The forty acres embraced in the Hull City placer is being prospected in every direction. No less than twenty-one sets of lessees are sinking and drifting. Ore is being shipped regularly from five shafts. The strike made by Killum Bros. & Ogilvie is one of the best discoveries in the district. At the 122 level the ore chute has been drifted on 50 feet. The vein at this point is 4 feet wide, with a pay streak 18 inches that, with sorting, is good for $50 per ton. A small seam of talc assays in the hundreds. A station for the second level has been started at 165 feet. The output this month will be fully 400 tons that will have a gross value of between $20,000 and $25,000. When the second level is opened the production will be increased. The vein was cut on its dip at the 150-foot point and the ore found to be fully as rich and wide as in the upper level.——The Last Dollar at Cripple Creek last month shipped thirty-two carloads of cyanide ore and twelve cars of smelting grade of a value of $7000 net.——The output of the Doyle last week was 140 tons at $70 per ton. ——Chicago capital secured an option on the Lindsay for $125,000 for ninety days and has begun the placing of machinery for extensive operations.——The Garfield Con. is taking ore from the 300 level which shows an average value of $1000 to the ton.——The Anna J made an output of seventy tons in March divided in

three grades, yielding $300, $80 and the mill rock $30 ——From the three chutes on the Modoc at Victor most of the production runs from $300 to $600 per ton.——The Gold Coin has 3 feet of mineral that runs $60 per ton. The tonnage for April is estimated at 4000. ——At Creede, Wilson & Combs struck a 3-foot vein said to carry 75 per cent lead.

Stockholders of the Boston & Cripple Creek G. M. Co. are called to meet in Cripple Creek, May 17th, to vote on proposition to increase capital stock to $400,000 without increasing number of shares; to increase par value to $2; to make shares assessable; to authorize directors to borrow money and mortgage the property.——The Mollie Gibson at Salida has been bonded to Riggs & Ross for $15,000. Development work under the new ownership is in progress.——N. Esperson has taken a bond on the L. S. Junior for $7500 and is pushing work.——The Little Jack has been leased for $25,000.

ARIZONA.

E S. Campbell has leased the Morning Glory mine and mill near Prescott, and will repair the mill and put men to work in the mine. Oregon capital is interested with Mr. Campbell. The ore is low grade but there is a large body of it.——The Cochise Copper M. Co. at Bisbee has thirteen claims. Eastern capital incorporated a new company which will push development. There are said to be 200,000 tons of ore on the dumps ——The ore chute on the McGilroy mine near Cedar is growing larger and of better grade as work progresses. The depth reached is 175 feet.—— Assays from a new discovery in the Harqua Halas near Mullen's Well show 76 per cent copper. The ledge is said to be 20 feet wide.

The Kingman *Miner* says that the mines of Shirttail mountain are showing large ore bodies and that a large mill must soon be erected in that locality to handle the output. ——The Temple Bar Con. M. Co. is rapidly getting its hydraulic plant on the Colorado river in position.——The bottom of the shaft in the Oro Plata mine is all in ore, and it averages eight ounces in gold ——J. P. Finigan of Chloride has bought the Lone Star mine, and will work the mine thoroughly. The ores of this property in pioneer days were shipped to Swansea for reduction.——T. Johnson sold the Chloride mine for $5000. The property is a lead producer. The *Republican* says that the Mammoth M. Co., operating about seventy miles southeast of Florence, has fifty stamps going. Water is secured on the San Pedro. An extension of the Mammoth is the Mohawk, where there are thirty stamps running. A tramway from the Mammoth to the San Pedro, three miles distant, has been in operation two weeks. The force at the mines and mills is fully 200 men. A stage runs to Tucson ——Seymour & Britton have bonded the Swallow property, comprising eleven claims near Briggs. Three of the claims are considerably developed. Some good ore has been found which is free milling and carries some copper values. The veins are from 3 to 12 inches in thickness and the ore averages $15. Development will be actively continued.——Salt Lake City people have bonded the Leman group. The agreement by which they receive title to the mine is the erecting of a 10 stamp mill and building a wagon road to the mine. They are to give the product of the mine to the extent of $35,000 to the owner, and if they fail to do this within the specified time they lose the mill and the outlay of money for making the road. ——Henry & Ritchie have sixteen claims near Florence, on which they have begun sinking four shafts.

The Gold Bonanza in Pima county is making regular shipments of high-grade ore. The San Xavier is extracting lead and copper ores. The Azurite made a strike on the 200 level of the carrying gold and silver. The Grant group and the Centennial are being developed by Eastern capitalists. The Helmet Peak mines are shipping ore of good values in gold and silver.

The Golden Wonder mine at Payson has 5 feet of ore, 4 feet of which will go $30 and 1 foot will run $100 per ton. The mine has reached a depth of 325 feet.——Concentrates are being shipped from the Grand Prize mine. ——The Arizona Copper Co. will put in another concentrator of 250 tons capacity.——The Birdie claim is producing good ore.——B. F. Steward is developing a claim in the same vicinity with satisfactory results.

LOWER CALIFORNIA.

Californian: The deposits near Ensenada, known as the Valladares placers, will be extensively developed by C. Bennett. Work has already begun. There are five claims, including Gopher hill, on Valladares creek. A large steam pump is to be installed both to drain the creek and furnish water for sluicing. These placers have been worked at intervals for thirty years in a primitive way. This is the first effort to work them by practical and extensive methods.

MEXICO.

At El Oro the shaft in the Mexican mine has reached considerable depth. It is 7 feet in quartz. The ledge is known as the San Rafael, a northern extension of the Esperanza.——The Carmen 30-stamp mill, owned by the Mexican Syndicate Co, is about completed and will be working the first of May. ——The American Mining Co.'s 100-stamp mill, the largest in Mexico, will, it is expected, start the first of July. —The shaft that C. D. Lane is sinking on the America's property is down 100 feet. The hoist and air compressor, together with the drills, etc., are en route to the camp from San Francisco.——The ground for the new hoist and compressor for the Esperanza has been broken, and the machinery is on the ground, and will be in working order in about thirty days. Their new cyanide plant is about finished and will be running within two weeks. This plant has a capacity of 100 tons daily.

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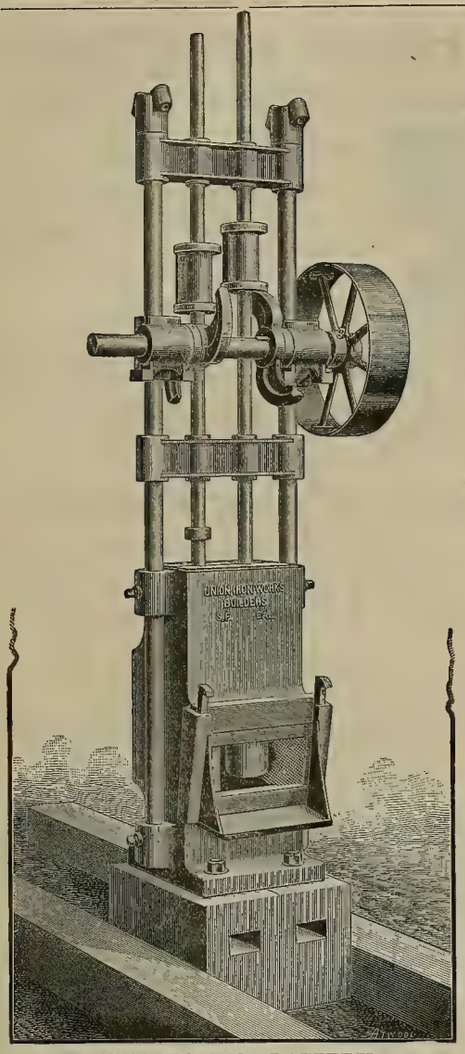
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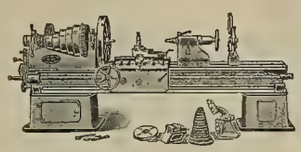
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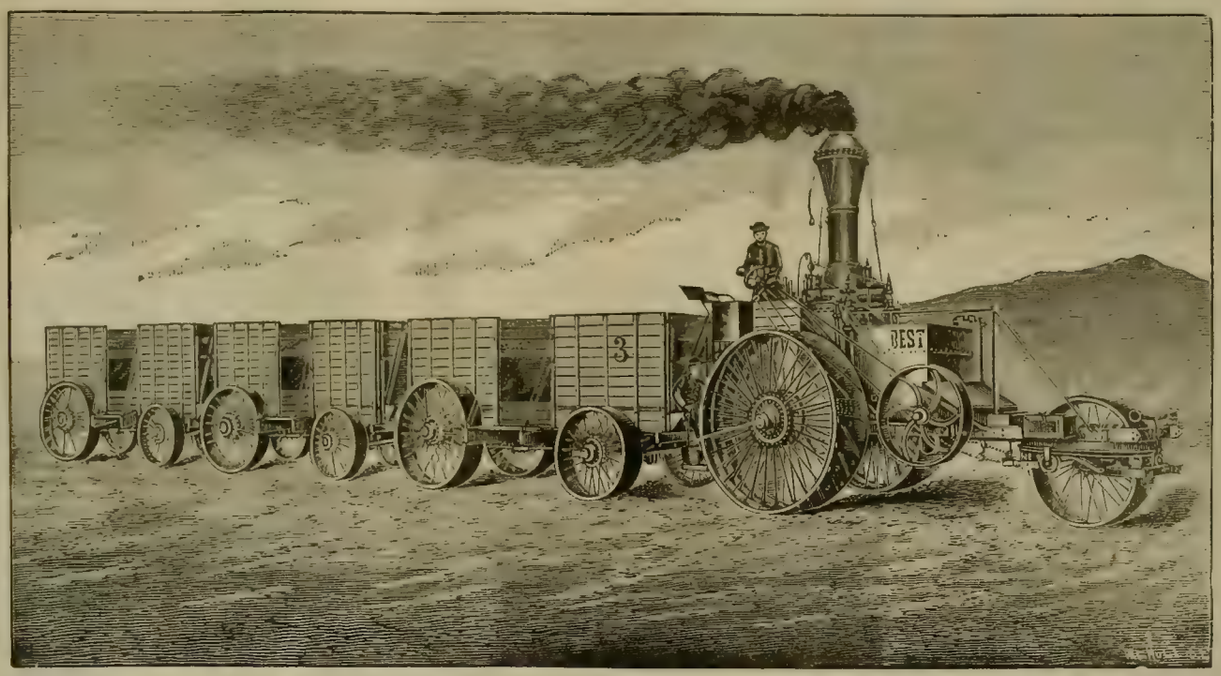
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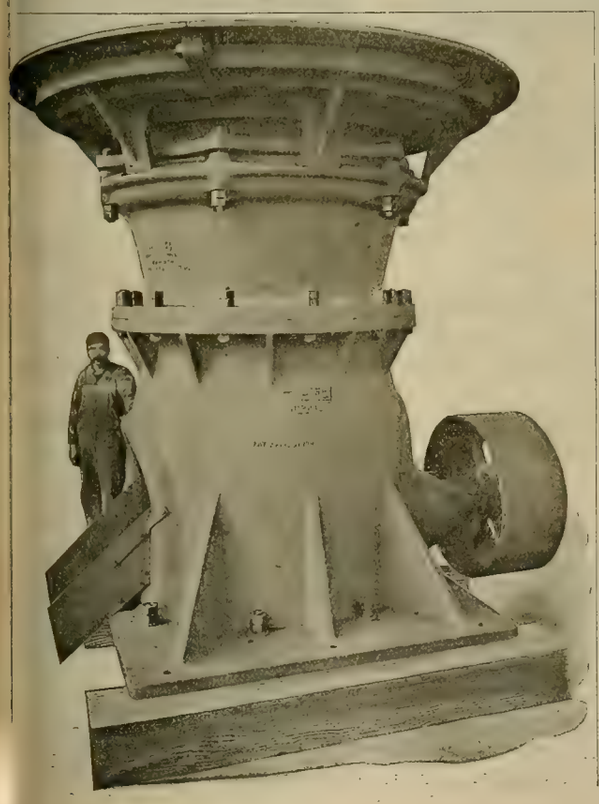
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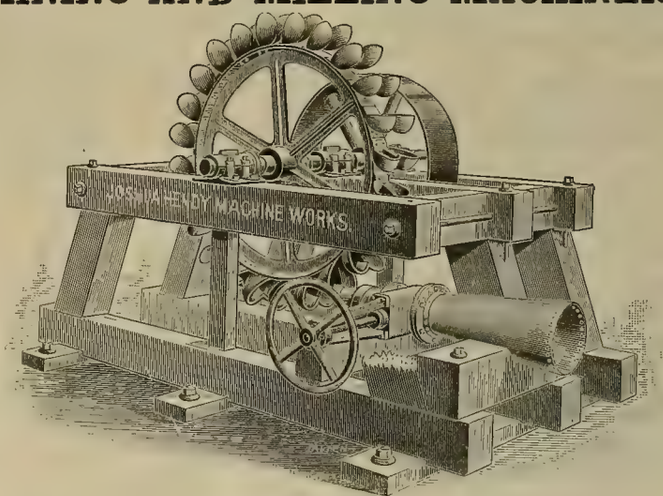
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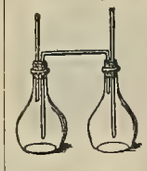
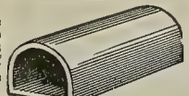
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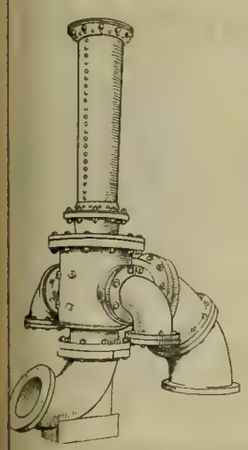
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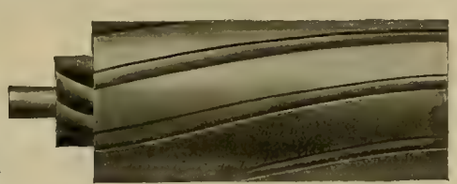
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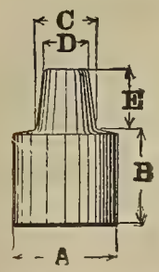
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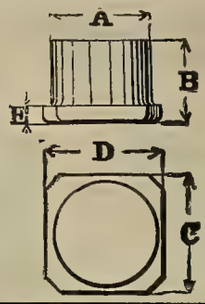
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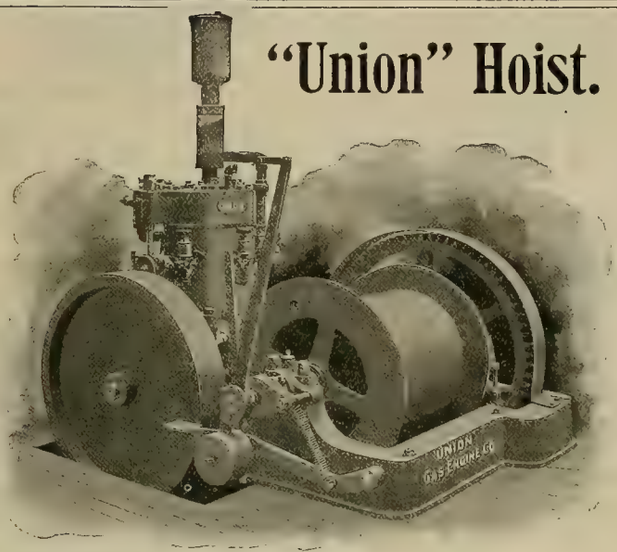
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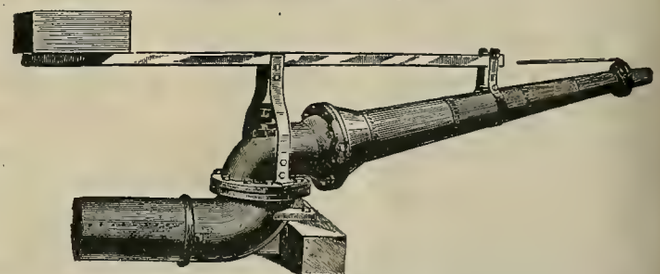
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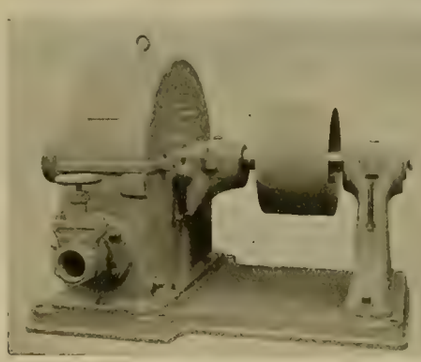
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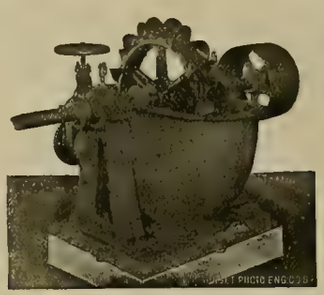
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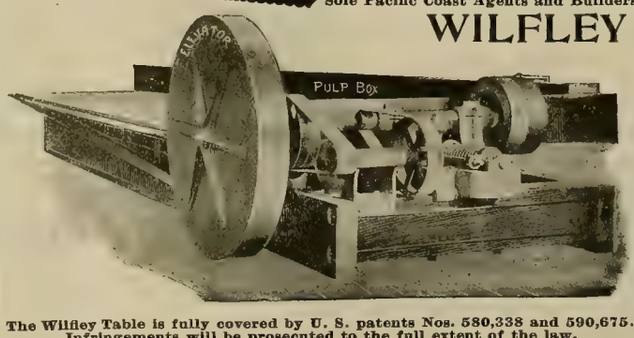
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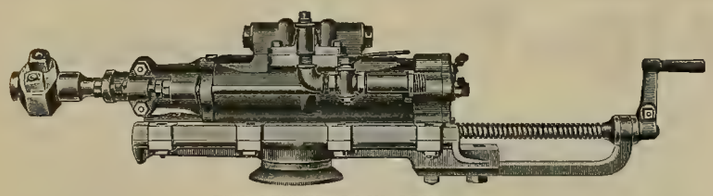
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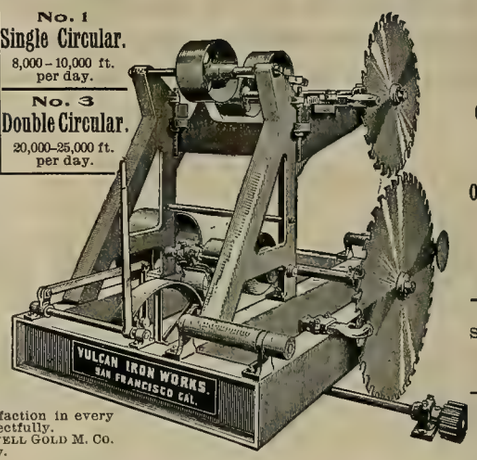
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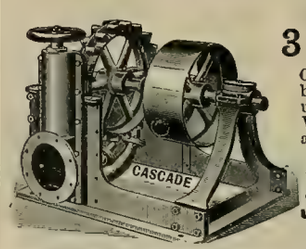
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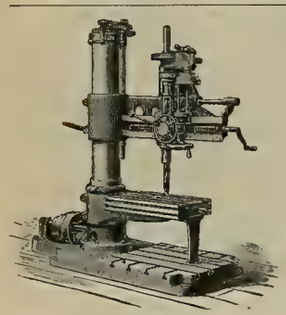


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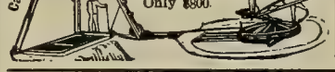
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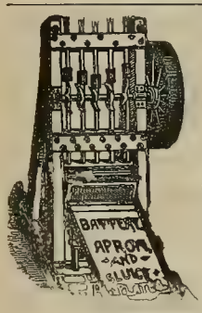
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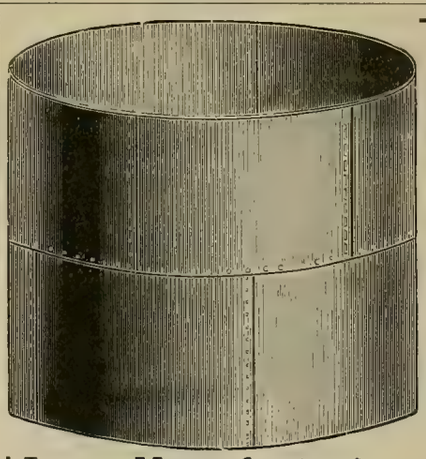
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Market Reports.

The Markets.

SAN FRANCISCO, April 14, 1898.

The war and the weather occasion a general advance in all prices and a general holding off of purchases, an uneasy combination. Actual declaration of war would further stiffen prices and enliven nearly everything except grain freights. At this writing it is difficult to correctly quote any figures on even staples. War is costly. The Civil War of 1861-65 cost, while it was going on, $2,920,000,000; interest during and since the war to July 1, 1897, $2,664,000,000; pensions since the war—$2,127,000,000; cost of the war to the end of the last fiscal year $7,711,000,000. When that war began there was a total of $150,000,000 gold in the country; there is now about five times that amount.

A New York dispatch says: Lake copper is strong at 12c bid. The Calumet & Hecla has no more copper for sale at 12c. It is intimated that the Calumet & Hecla brand would bring 12¼c for prompt delivery.

Silver is quoted in New York to-day at 56c, London, 26d; San Francisco 56c. New York quotes tin, 14.45; lead 3.67½.

Mining Share Market, Etc.

The Brunswick lode is at last in a fair way to have work resumed thereon. President Leonard of the Comstock Tunnel Co. and the Gould & Curry, Savage, Con. Cal. & Virginia, Best & Belcher, Hale & Norcross, Chollar, and Potosi Companies have come to an agreement which will enable the latter to prospect the Brunswick lode from the Comstock tunnel. They will run a drift along the lode on each side of the tunnel and haul out the ore and waste rock from the mines through the tunnel. This involves a great deal, not only to the Comstock, but, as noticed last week, to the interests of the American Flat and Silver City districts. It was about time that something of the kind was done and the Comstock is to be congratulated on the turn events have taken. So much has been said herein in favor of the project that it is with pleasure this announcement is made.

The Comstock tunnel strikes the Brunswick lode about 1300 feet from the surface, so that development work can begin at that depth; and can of course be carried on much cheaper from the tunnel than from the surface.

The agreement has not been finally accepted by the trustees of the Comstock Tunnel Co. in New York or by the Union Trust Co. of that city, who are trustees for the bondholders; but it is looked upon as settled. The agreement is a very lengthy document; but the salient points are as outlined above.

As foreshadowed in last week's issue, the supreme court decision in the Hale & Norcross case was handed down last Saturday. It in part sustains the decision of Judge Hebbard of the superior court, some time ago, for a judgment of $210,000 in favor of M. W. Fox et al., with interest from May 26th, '92, making a total of $321,200. Regarding the judgment rendered by Judge Hebbard for $417,600, with interest, aggregating $627,600, for alleged frauds in milling operations, the supreme court orders a new trial and instructs the lower court to proceed not on the assumption of fraud, but in accordance with a rule and public policy which declares illegal, contracts made by trustees with themselves whereby they derive benefit. The result of the decision was, of course, weak prices throughout, which prevailed until Wednesday, when there was a slight improvement.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 14, 1898.

9:30 A. M. SESSION.

400 Alta	25	900 Mexican	26
300 Andes	12	200 Occidental	2 80
600 Belcher	17	1000 Ophir	59
500 Best & Belcher	38	450 Potosi	30
400 Caledonia	20	500 Savage	14
650 Chollar	30	1350 Sierra Nevada	77
850 Con Cal & Va	78	900 Union	26
1400 Gould & Curry	12	800 Yellow Jacket	13

SECOND SESSION—2:30 P. M.

200 Ophir	62	25 H. & N	70
100 Mexican	25	200 Alpha	05
200 Gould & Curry	16	800 Sierra Nevada	85
500 Best & Belcher	38	500 Utah	04
100 Con Cal & Va	80	100 Overman	06
1050 Savage	18	100 Justice	16
300 Chollar	35	700 Alta	27
500 Potosi	39		

The Pacific Tank Company.

Owing to the increasing demand for the "patent non-shrinking" tanks built by the above-named company, it has been found necessary to establish another factory at San Pedro in addition to the large plant now operating in this city. The new factory has wharfage and direct railroad connections, which will add greatly to economy and facility in handling the southern trade. This company has built up a great business in these tanks within the past few years, as they have been found to stand the severe dry climate test, and have proved to be the best and most practical tank made. A specialty is being made of mining and cyanide tanks, also silos, as well as the only wooden tank that can be used exclusively for crude or rectified oil. In connection with the new works at San Pedro, the company has an office and warehouse at No. 348 Second St., Los Angeles. The San Francisco office is at 38 Beale street. Circulars descriptive of the tanks will be sent from either office. *

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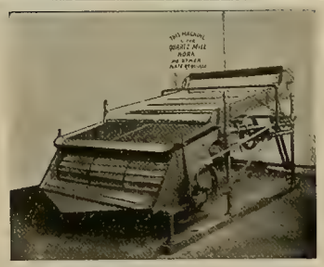
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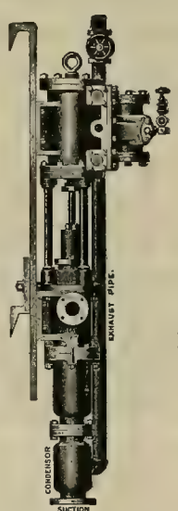
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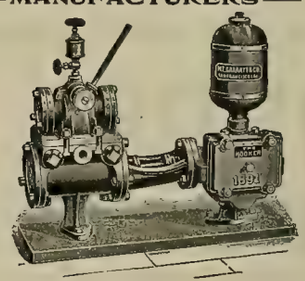
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NOTICE OF ANNUAL MEETING.

JAMISON MINING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California; works, on Jamison Creek, near Johnsville, Plumas County, California.

In accordance with the by-laws of said company, the annual meeting of the stockholders of the Jamison Mining Company will be held at the office of the company, rooms 50 and 54, 120 Sutter Street, San Francisco, California, at 2 P. M., on MONDAY, the 2nd day of May, 1898.

SAM. W. CHEYNEY, Secretary.

Dated March 11th, 1898.

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Assessment Notices.

ONSOLIDATED ST. GOTHARD GOLD MINING mpany.—Location of principal place of busi- ss, 113 Crocker building, San Francisco, Califor- a; location of works, Nevada County, California. Notice is hereby given, that at a meeting of the ard of Directors, held on the 10th day of March, e an assessment (No. 15) of 15 cents per share was ied upon the capital stock of the corporation, yable immediately in United States gold coin, to e secretary, at the office of the company, 113 ocker building, sixth floor, San Francisco, Cali- rnia. Any stock upon which this assessment shall re- in unpaid on the 19th day of April, 1898, will be linquent and advertised for sale at public auc- n; and unless payment is made before, will be d on WEDNESDAY, the 11th day of May, 1898, to y the delinquent assessment, together with the ts of advertising and expenses of sale. y order of the Board of Directors.

J. F. HOLLING, Secretary.

ffice—113 Crocker building, sixth floor, San Fran- sco, California.

UBER MINING COMPANY.—LOCATION OF ncipal place of business, San Francisco, Califor- a; location of works, Panamint district, Inyo unty, California. Notice is hereby given that, at a meeting of the ard of Directors, held on the 22d day of March, , an assessment (No. 1) of fifty (50) cents per are was levied upon the capital stock of the cor- ration, payable immediately, in United States d coin, to the Secretary, at the office of the com- ny, No. 310 Pine street, rooms 15 and 17, San Fran- sco, California. ny stock upon which this assessment shall main unpaid on the 3d day of May, 1898, will be linquent and advertised for sale at public auc- n, and, unless payment is made before, will be d on THURSDAY, the 2d day of June, 1898, to pay delinquent assessment, together with the costs ts of advertising and expenses of sale. y order of the Board of Directors.

J. W. PEW, Secretary.

ffice—No. 310 Pine street, rooms 15 and 17, San ancisco, California.

OULD & CURRY SILVER MINING COMPANY. cation of principal place of business, San Fran- co, California; location of works, Virginia, rey County, Nevada. Notice is hereby given, that at a meeting of the ard of Directors, held on the 16th day of March, , an assessment (No. 85) of 15 cents per share, s levied upon the capital stock of the corpora- n, payable immediately in United States gold n, to the secretary, at the office of the company, om No. 69, Nevada block, No. 309 Montgomery eet, San Francisco, California. ny stock upon which this assessment shall re- in unpaid on the 19th day of April, 1898, shall be linquent and advertised for sale at public auc- n; and unless payment is made before, will be d on TUESDAY, the 10th day of May, 1898, to pay delinquent assessment, together with costs of vertising and expenses of sale. y order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

ffice—Room No. 69, Nevada block, No. 309 Mont- mery street, San Francisco, California.

HURCH GOLD MINING COMPANY.—LOCATION principal place of business, San Francisco, Cali- nia; location of works, El Dorado, California. otice is hereby given that, at a meeting of the rd of Directors, held on the 23d day of March, , an assessment (No. 1) of 3 cents per share was ied upon the capital stock of the corporation, yable immediately, in United States gold coin, to Secretary at the office of the company, room 15, vada block, San Francisco, California. ny stock upon which this assessment shall re- in unpaid on the 29th day of April, 1898, will be linquent and advertised for sale at public auction, d, unless payment is made before, will be sold on NDAY, the 23d day of May, 1898, to pay the delin- ent assessment, together with the costs of adver- ng and expenses of sale. y order of the Board of Directors.

A. P. SWAIN, Acting Secretary.

ffice—Room 15, Nevada block, San Francisco, lifornia.



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SAN FRANCISCO.

DELINQUENT SALE NOTICE.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 6) levied on the 25th day of February, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Wm. T Thomas	20	157	157 00

And in accordance with law, and an order from the Board of Directors, made on the 25th day of February, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, room 24, 320 Sansome street, San Francisco, California, on TUESDAY, the 26th day of April, 1898, at the hour of 3 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

DELINQUENT SALE NOTICE.

THE MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 9) levied on the 19th day of February, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Meta Ecks	102	150	15 00
Gottlob Gall	121	1,000	100 00
Gottlob Gall	122	1,000	100 00
Gottlob Gall	124	300	30 00
Gottlob Gall	125	200	20 00
Gottlob Gall	143	200	20 00
Paul Buhr	212	100	10 00
Joseph Rohrer	279	50	5 00

And in accordance with law, and an order from the Board of Directors, made on the 19th day of February, 1898, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, 237 Twelfth street, San Francisco, California, on MONDAY, the 2nd day of May, 1898, at the hour of 6 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

F. METTMANN, Secretary.

Office—237 Twelfth street, San Francisco, California.

ORES! ORES!

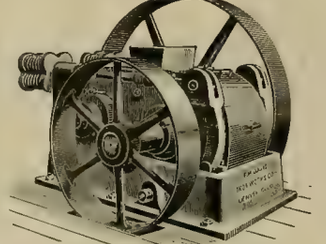
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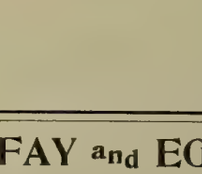
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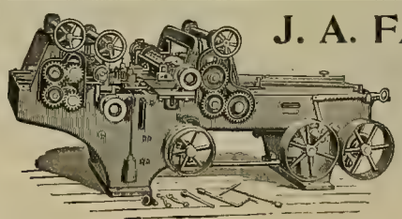


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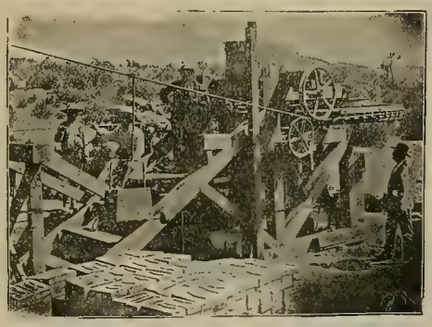
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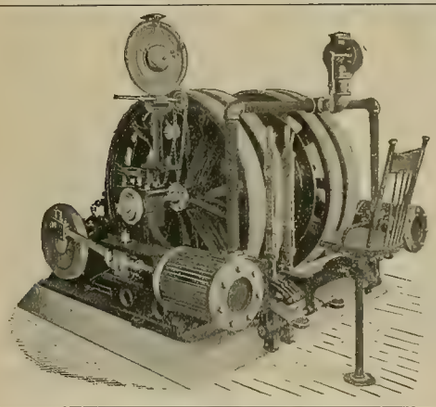
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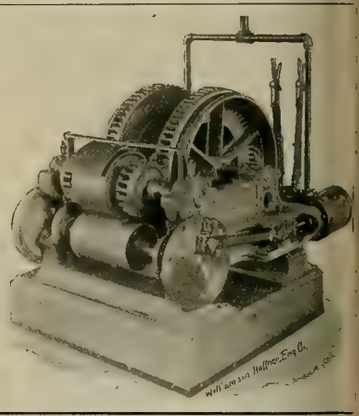
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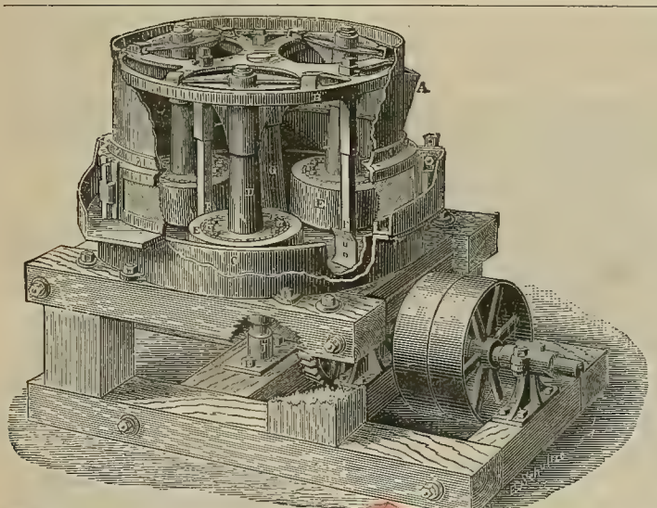
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FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco.

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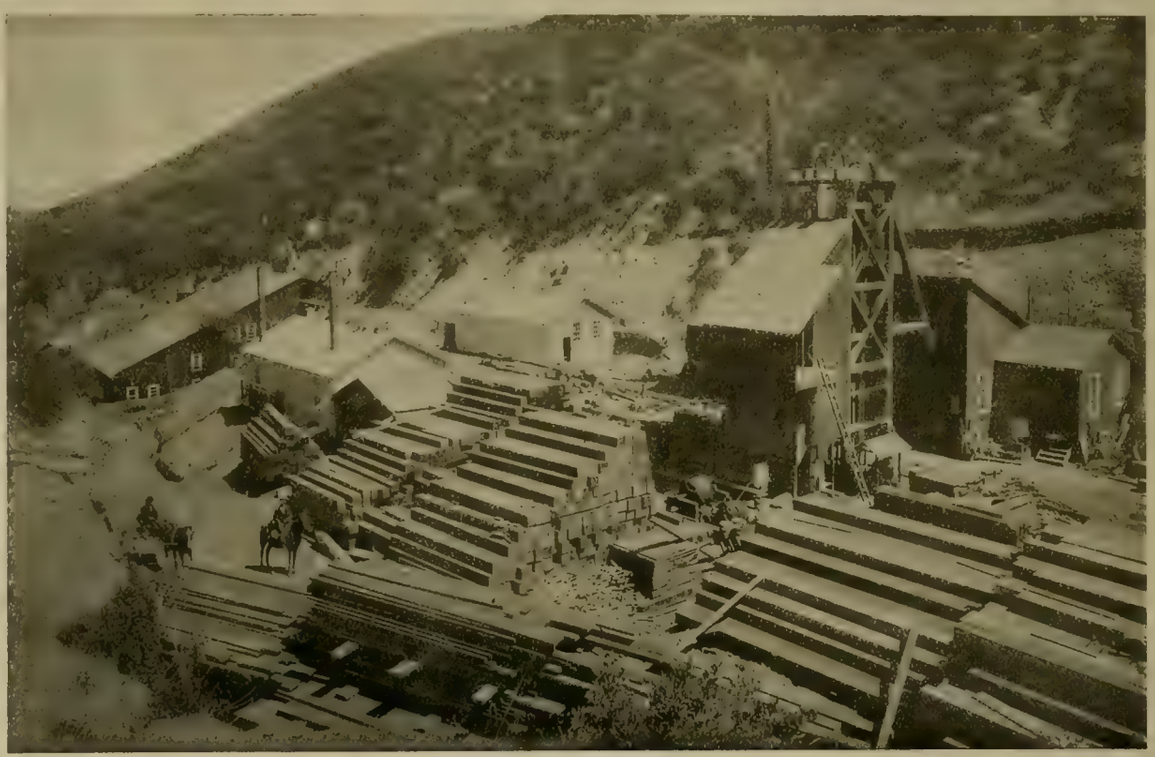
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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1972.—VOLUME LXXVI. Number 17. SAN FRANCISCO, SATURDAY, APRIL 23, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A California Gold Mine.

From the Mining Resources of Calaveras Co., Cal., is taken some notes on the working of the Gwin mine, and, incidentally, the general condition of the gold mining industry in that region. The article referred to is conservative and contains much practical information. It is worthy of note as a prefatory statement that the method of treating gold sulphurets by chlorination, which is simply the discovery of the chemical affinity of chlorine gas for gold, was first successfully tried at the Gwin mine, Calaveras Co., Cal. This mine is chosen as illustrative of what intelligent work and investment of considerable capital by California miners will do in making a valuable property out of what had been abandoned and believed to have been "worked out."



THE GWIN MINE HOIST.

The Gwin mine was one of the first quartz gold mines to be opened up in California. Some miners in 1850 having found the surface pay croppings of the Gwin mine, were joined by a few others, and the shaft was sunk 200 feet on the incline of the vein. The method of reclaiming the gold in the sulphurets not being known, the values obtained were entirely from the free gold and the sulphurets went to waste. Dr. Gwin, one of California's first Senators, took hold of the mine about that time, and a water power hoist was put in, with a capacity to sink 1000 feet. Messrs. Deetkin and Garland also introduced the Plattner chlorination process a little later, to treat the sulphurets, which enabled them to work the low grade ores successfully. Even then it was impossible to obtain a profit on any ore not assaying $6 or $8 per ton, although the mill capacity had been increased to handle large quantities of quartz. Very rich ore in streaks was taken out from time to time, but as the mine reached a depth of 1350 feet, the necessity of more effective material became apparent. The management, however, went on taking out such ore as could be made to pay. All the high grade ore in sight was mined, and the mine was thus "gutted out." As the shaft reached greater depths, the water increased. The pumps and buckets were of insufficient capacity. The drifts had been run about 1200 feet north and about 100 feet south, and the mine was allowed to fill up with water. The drop in value of all California gold properties took place at that time, and the owners could not get the means required to reopen it. A little later forest fires devastated the vicinity, and in 1894, when the present company took hold of it, a deserted log cabin here and there, or a coil of rusty rope, with bundles of old iron and steel, scattered down the gulch, were the only traces of former activity.



INTERIOR OF GWIN MILL CONCENTRATING PLANT.

Believing in the permanency of the lode in depth, and knowing of the actual existence of large quantities of low grade ore in the upper levels of the mine, Supt. F. F. Thomas conceived the plan of bonding the

(Continued on page 440.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent.

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J. F. HALLORAN.....General Manager

San Francisco, April 23, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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THE Western Federation of Miners say that at their annual convention in Salt Lake City, Utah, next month, they will proffer the President 10,000 men on condition that they be assigned active duty and sent to the front.

WAR between the two chief copper-producing countries—the United States and Spain—on top of the great electrical demand will occasion a "boom" in the price. Under present ordinary conditions, not even gold mining is so uniformly profitable. The Rio Tinto Co. of Spain announces a forty per cent dividend for 1897.

AT a meeting of the directors of the Fauvel Gold Recovery Co., in London, March 29th, C. J. Fauvel asserted that his process was a commercial success, that in his furnace he could roast ore in eighteen seconds, and that he had "control of the gold mining industry of the world." He also stated that his furnace burned "2½ tons fuel in 24 hours and about 3 tons of water," which seems to be a good deal of water. He also volunteered the information, "when we send a plant out we shall say 'keep your furnace up to 1400 degrees,' and you will get results of 90 or 95 per cent of the gold from your ore." A full description of this process was published in this journal in the issue of Jan. 4, 1896.

THE Virginia, Nevada, *Enterprise*, pointing out that prospectors are likely to help fight Spain, suggests the enactment by Congress of a law providing that in case any locator of a mineral claim should join the army, that fact would relieve him of the obligation to do his annual assessment on his mining claims during the year in which he might serve as a soldier. On the 20th inst., Senator Shoup of Ihaho introduced in the Senate a bill providing protection for miners who may want to go to the front in the volunteer army. The measure sets forth the provision of the present mining laws under which any claim on which assessment work amounting to $100 has not been performed each year shall be subject to forfeiture, and then makes an amendment to the effect that in no case shall there be a forfeiture where the miner was serving any part of the year in the army as a volunteer.

THE recent visit of Dr. Day, Chief of the Mining Bureau of the U. S. Geological Survey, to California, may result in securing a mineral exhibit by this State at the Omaha Exposition. Dr Day's plan is an excellent one and deserves more hearty co-operation than it has received. It was virtually decided last month by those who had the matter in charge that nothing in the way of mineral exhibit would be done by this State at the Transmississippi Exposition. Since then three commissioners, De Young, Ford and Yale have been appointed to take charge, and a present effort is being made to at least secure the transmission of the mineral exhibit of the California State Mining Bureau, which is now being boxed up prior to its removal to the new Union depot. At this writing it is understood that nothing is needed but the consent of the Governor of the State to secure the shipment of that fine exhibit to the Nebraska city for exhibition of California's mineral wealth. It would be a mistake every way to permit such an opportunity to go unembraced. The Commissioners referred to desire to announce that any ores, building stone, mineral specimens, etc., sent to them will be forwarded to Omaha. All such specimens intended for exhibit should be sent to the State Mining Bureau, 24 Fourth St., San Francisco.

CARE is necessary on the part of prospectors and mine locators in making their locations to ascertain as closely as possible the strike of the vein and to place their posts accordingly. To simply find a few outcroppings, upturn a little, sight along by eye measurement, make a sort of a decision which way the vein strikes, and then locate and record, does not always do; for very often, after considerable time and effort, the locator is likely to find that the vein has reached out of his side boundaries one way or the other, or is very close to one of them, instead of about the middle of the 600 feet as he supposed. This may do until the property becomes valuable, when results the inevitable lawsuit to decide side lines, or extra lateral rights and all that, which can be usually avoided by some intelligent work in the beginning. Some time ago the Supreme Court of Colorado, in the case of the Smuggler vs. the Fulton and M. claims, decided to the effect that a claimant had no right to follow his vein or its dip outside of the side lines, unless the vein passed out of both end lines; thus giving an illustration of why prospectors and locators should be careful about locating as closely as possible along the strike of the vein, even if it involves the sinking of a few prospect shafts, for the expense may after all prove an economical measure. Then, before recording, it is well to have the side lines closely approximated. Quite recently a suit involving a similar question was tried at Virginia City, Montana. The plaintiffs proved that the posting of the notice of location was in the usual form; but they described the course of the lode as "northerly and southerly," while it came out in the evidence that the true direction of the line was about northwest and southwest. After they had posted their notice they left their claim temporarily, returning after six weeks; but during their absence the defendants in the suit referred to had made a location in that vicinity, running a line due north, which conflicted with the plaintiffs' location. The plaintiffs had, before the expiration of the ninety days required in Montana for the setting of posts, sunk their shaft, established their corners and recorded their declaratory statement. Their counsel maintained that the location notices should be liberally construed, and that as the statute required the "general course of the lode as near as may be," the term "north" would protect a location made northwesterly. The defendants' counsel maintained that those terms north and south should be strictly construed, in which the court agreed and held that the the locator was bound strictly by his location notices, finding for the defendant. While it is believed that the justice of the case lay with the plaintiffs, nevertheless strict technical construction gave the defendants the legal rights in the matter. This decision indicates the necessity for the locator to be sure of his bearings, or else be definite about the setting of his corner posts or notices. It will not do for him, in Montana, to take ninety days after posting his notice to mark his corners. As usual, the case will be appealed. The Montana State law gives the prospector ninety days to set his corner posts, define his boundaries and sink a 10-foot shaft, the idea being to give the locator some time to determine the trend of the vein, that he may properly place his end lines and protect his extra lateral rights, as it is manifestly impossible to determine the exact direction of the vein until the property has been developed to a certain extent, but under this recent Montana decision the prospector has no protection unless he places his corner posts immediately upon making discovery or location. Thus he seems to have to take his chances immediately, and if he finds himself wrong he is liable to lose his holdings should his side line be shown to be the end lines, that is, unless he has sufficient money and patience to take the case to the Supreme Court of the United States. The matter is referred to simply to illustrate the necessity of care on the part of the prospector or locator, to be as exact as possible and to give as little opportunity as can be given for litigation, which is always vexatious and expensive.

OBJECTION is made in an exchange to the alleged tyranny of an employer in a certain instance discharging an employe, whose personal habits outside of his work and working hours were not satisfactory, and the deduction drawn therefrom that the employer had no business to make such unwarranted decision; that what a man did outside of his official hours was his own business and nobody else's; that it is nobody's business what an employe does, provided he does a day's work for the man or men whose pay he accepts while on duty; but still, it may be said, that the employe may act in such a manner as to invalidate his own worth. Strictly speaking, the employe lost his position not for what he had done when off duty, but because he was of lessened use to his employer while on duty. An employe usually understands what he can or cannot do with due regard to his bodily, mental or moral efficiency. For instance: The ordinary man or woman may not be as sensitive as an imaginative child, that will lie awake in horror after hearing or reading a ghost story. Nevertheless, the man or woman so constituted would probably find it necessary to either give up his or her job or else quit reading ghost stories at midnight. It is not at all likely that a man or woman would be consulted as to his or her literary tastes in the matter; but would be removed because he or she could not render the necessary aid, and would be succeeded by some one who could do so. A man working in a mine, or an engineer at the hoist, has a right, so far as he is individually concerned, to get drunk any time that he is not on duty; nevertheless, probably the man who went down in the cage would object to the engineer in charge if he knew that that employe had been up all night in a drinking resort; or he might feel a little hesitation about going to put in a hole or put off a blast with a fellow workman who had been too convivial the evening before and hadn't got over it. Everyone who has attained years of discretion has a right to his own opinion; still it is believed that it would be unwise for a bank cashier or a trusty bookkeeper to be frequently seen with a man who had been convicted of theft. It is just possible he would lose his situation. Were any member, for instance, of a labor organization known to be dishonest, there might not be any motion made for his expulsion; but nevertheless the other members of the union would not care to consider him as a candidate for the treasurership. There are certain unwritten laws in this world which will remain unwritten, because it is supposed that the average man will have common sense, and it is impossible to lay down rules. It is absurd to assume that a mine manager or any other class of employers wants to exercise any despotism over the employes or anybody else. The whole fact of the matter is that a man who is not qualified will always find a better qualified man who is ready to take his place.

CO OPERATIVE MINING, rightly conducted, is a paying proposition. Men earning a little more than their daily requirements and wanting to have their surplus money produce them more than the ordinary savings bank investment, can get together to the number of ten or fifteen, each paying a settled amount weekly into a common fund for prospecting. The main point is to be sure of their man, for the strength of a venture of this kind depends upon the ability and reliability of the prospector who spends the money. When he has a good prospect, a little more than the first quota will be required to develop it. In this development expensive machinery is not to be thought of at first; mining machinery men now make small stamp mills that are economical and effective; two, three and sometimes five heavy rapid-drop stamps, discharging on three sides, are in this

regard found satisfactory. In case extensive development or purchase of expensive machinery is deemed necessary, when that point is reached is a good time to get expert opinion, for then begins the manufacture of a mine, which is as important as its discovery, and the question arises whether it is best to sell or bond, or for the co-operators to make their own developments. Of course such an investment as that indicated needs close watching. Though confidence be at the bottom of it, nevertheless it would not do to take too much for granted, and each one interested must have immediate knowledge of just what is being done. Many a fine property has been discovered and developed by just such small beginnings, the same rules being required in this as in any other legitimate business, the advantage in mining investments being that there is no more gamble about it than any other business, and where successful it is unusually satisfactory. Where such a scheme is pushed it is often easy to find a buyer, with the joint stipulation that all the money is to be used for developing, the original owners retaining certain interests—that is, they would part with a portion of their holdings for the sake of having the property developed, on the proposition that without such additional capital they could not go ahead and that it would be better to own one-third of a developed mine than three-thirds of a prospect, as an undeveloped mineral location is probably the most unproductive form of real estate that one can possess. There is much in the mutual plan to commend itself to the judgment and action of small capitalists.

Defining Hydraulic Mining.

The news published herein last week of the ruling or decision of the California Debris Commission, giving their interpretation of hydraulic mining, has naturally occasioned great interest in every district affected thereby. In this regard it is considered timely to publish the following, being extracts from a letter written eleven months ago by T. L. Ford of San Francisco to an inquirer regarding the discussion then going on before and by the Debris Commission as to what constituted hydraulic mining:

The Caminetti Act was approved March 1, 1893. It placed one class of mining, namely, "hydraulic mining," under the jurisdiction and control of the California Debris Commission, prescribing rules and regulations for the carrying on of that particular branch of mining. The Act specially limited the jurisdiction of the Commission to hydraulic mining, thus excluding all other kinds of mining from the Act. As you know, there are many kinds or classes of mining well understood and recognized in this State. Among the more familiar classes are "ground sluicing" etc., etc., to which must be added the equally familiar and distinctly recognized method or class known as "hydraulic mining." Thus you will note that the Commission has nothing to do with quartz mining, river mining, drift mining, working of tailings, ground sluicing, or any other class, kind or method of mining save hydraulic mining alone. The Act nowhere specifically defines hydraulic mining but does declare that "hydraulic mining" and "mining by the hydraulic process" be construed to have the meaning given to these terms in California.

I am not advised as to what argument was advanced before the Commission in relation to the question suggested in your letter, but I do know that the ordinary rules of statutory construction must govern. By the proper application of such rules it ought not be difficult to ascertain the limits of the field in which the Commission is authorized to act.

Rules of Statutory Construction.—Words in a statute are to be construed by reference to the subject matter of the enactment. Technical words, when used in referring to a technical subject, are to be given the meaning which they have when applied to the particular business, art, or science with reference to which they are used, that is to say, their technical meaning. A statute is to be interpreted in accordance with the meaning of its words at the time of its passage. The history of the times and the purposes sought to be accomplished are proper matters for consideration.

Application of Foregoing Rules.—The problem is to ascertain what was the meaning of the term "hydraulic mining" on the first day of March, 1893, as that term was then used and understood in California.

We know that the particular method of mining known as "hydraulic mining" was invented and perfected in California and was thence introduced into other gold-producing countries, notably Australia. We know that hydraulic mining, as understood by the miners of California, is a distinct method, class, or species of mining; and we further know that it was this distinct method, class, or species of mining that Congress had in mind when passing the Caminetti Act. The motives that governed Congress in thus limiting the jurisdiction of the Commission to this one particular class of mining are not far to seek. It was a new field for Federal legislation and Federal control. New duties of a somewhat experimental character were to be imposed upon United States engineers. They were to license, supervise, and control the conduct of a private business. Necessarily some limitation of this novel duty was necessary. This limitation was the logical outcome of the mutual concessions made by the miners and the farmers, respectively. The warfare between the two sections had been long, bitter, and expensive. In January, 1892, the two sections came together at the initial meeting of the California Miners' Association, and a desire for harmony was manifested and mutual concessions proffered. The valley people disclaimed any desire or intention to interfere with any kind or character of mining save hydraulic mining alone. Let this character of mining be stopped or rendered harmless, and they would be content. The miners accepted the plan or proposition thus advanced, and, jointly with representatives of the valley, urged upon Congress the enactment of such legislation as would regulate and control the branch or class of mining complained of by the people of the valley. Thus the attention of Congress was directed specifically to hydraulic mining, and thus it was that the jurisdiction of the United States engineers was limited to that class of mining by the Act that resulted from the facts above stated.

Question.—What is "hydraulic mining" as that term was understood in California on March 1, 1893, the date of the passage of the Caminetti Act?

Generally.—The Standard dictionary thus defines "hydraulic mining:" "A method of mining in which a bank of gold-bearing earth or gravel is washed away by a powerful jet of water and carried into sluices, where the gold separates from the earth by its specific gravity."

The Century dictionary, in its definition of "hydraulic mining," uses the following language: "The essential feature of the method is that the gravel is broken up and washed down into the head of the sluice by one or more powerful jets of water, thrown upon the bank and used in such a way as to furnish a current of sufficient velocity to carry the debris down into the sluice."

The U. S. engineers appointed under the act of Oct. 1, 1888, commonly known as the Biggs Act, thus define "hydraulic mining" in their report to the chief of engineers: "The excavating and moving of the auriferous earths by heavy streams of water under pressure, and conveying the same through sluices to the dumps."

Thus we see that hydraulic mining involves several properties, or qualifications:

1. It is mining by means of the application of water. This, however, is true of all gold mining in this State, so we must seek for some further distinguishing feature.

2. The water must be applied under pressure, and, of necessity, through a nozzle. But this is equally true of various other kinds of mining, as, for example, "drift mining," where the gravel is run out in cars through tunnels to a common dump or place of temporary deposit where the water is applied under pressure and through a nozzle precisely as in hydraulic mining.

3. The water must be applied against "a bank of gold-bearing earth," as stated in the Standard dictionary; or "thrown upon the bank," as stated in the Century dictionary; or, as stated in the U. S. Engineer's report, the water must be used in "excavating and moving the auriferous earths."

That against which the water is applied, then, would seem to be the distinguishing feature and the controlling factor in determining what is and what is not hydraulic mining.

The water must be applied against a "bank" for the purpose of "excavating and removing the auriferous earths" say the authorities above quoted. But what kind of a "bank" must be thus attacked? Of course, there are many kinds of banks that would not fulfill the necessary requirements, as, for example, a bank of gravel taken from a drift mine, a bank of tailings collected from former mining operations, and the like. The fact is that in this State, the bank to be attacked is well understood to be a natural bank and not a bank of gravel or tailings artificially collected or deposited. The fact is so well understood in this State that when the State Legislature came to lay down the rules that should govern the business of hydraulic mining it was expressly declared that hydraulic mining was "mining by means of the application of water, under pressure, through a nozzle, against a natural bank."

It is worthy of note that the definition thus given of hydraulic mining by the State Legislature is contained in an Act that was pending in the State Legislature at the very time of the passage and approval of the Caminetti Act, and which became a law through executive approval on March 24, 1893, but twenty-two days after the passage and approval of the Caminetti Act. The State Act would, therefore, seem to furnish a definition of the term "hydraulic mining" as understood in California cotemporaneously with the passage of the Caminetti Act.

There can be no question but that the State Act above referred to accurately states the true technical meaning of the term "hydraulic mining" as the same was understood in California both before and since, as well as at the time of, the passage and approval of the Caminetti Act. Such will be found to be the universal and concurrent opinion of those whose knowledge and experience entitle them to speak with authority upon the subject.

If any further evidence be needed upon this point, it may be found at page 48 of Vol. II of the American Supplement to the Encyclopedia Britannica, where the following full, clear and correct definition will be found:

"Hydraulic mining consists in the plan of breaking down and disintegrating the banks of auriferous gravel as they stand in place, by means of water discharged against the same in large quantity and under pressure, this gravel being afterwards carried by the released water into sluices furnished with riffles and other appliances for catching and retaining the gold."

Thus we see that the banks as "they stand in place" are the kind of banks against which the water is directed in "hydraulic mining." The words "in place" constitute a well known mining term, and, when applied to rock, gravel or other substance, indicate that the same is where it was placed or left by nature as distinguished from any artificial arrangement, location, or deposit, through human agencies. Thus we speak of "rock in place;" this phrase or term being also found in the Federal mining laws, and meaning rock where placed by nature. So a "bank of auriferous gravel as it stands in place" means simply a bank as nature made it, or, as the State statute has it, a "natural bank."

I understand an effort has been made to extract from decisions of the State and Federal courts a definition of hydraulic mining. This, however, must fail, for the sufficient reason that no authoritative definition of the term has yet been given by any court. The nearest approach to it was an incidental remark made by Judge Sawyer in the famous North Bloomfield case. In that case the water used was partly under pressure and partly not under pressure, the latter flowing over the high banks and causing them to cave down. The banks thus attacked were natural banks, and water under pressure was used jointly with the water flowing over the banks. This, Judge Sawyer said, he considered hydraulic mining. The decision of the case, however, in no wise depended upon whether the mining in question was, or was not, hydraulic mining, the decree entered being against the deposit of debris in the streams, regardless of the character of the mining or the process or methods employed.

Before the California Debris Commission, however, an entirely different question is presented. Here the question is not one of inquiry or damage resulting from mining generally, as was the case before Judge Sawyer, but a question of jurisdiction based upon a correct definition of the term "hydraulic mining" as that term was understood in California on the first day of March, 1893.

THE following is stated to be an exact statement of what transpired in a California county this week, and is furnished as illustration of one of the ways that capital is locally deterred from investment in mining property:

A. has a bond on a group of mines at a stipulated sum. He has the signature of the president, secretary and treasurer of the company to the bond. He succeeds in enlisting capital to reopen the properties. B. comes in and offers $25,000 more for the bond than has been agreed upon with A. It is discovered that, in making the bond to A., the signatures of a majority of the stockholders had not yet been obtained, and that consequently, under the laws of California, the bond is invalid. At much expense and delay the original work is rectified with the risk by A. of losing his bond. The deal, however, fell through by reason of the necessarily long delay. B., who caused the trouble, fails, however, to secure the bond proposed by him, and the whole thing is upset.

If correctly understood in this case, the original intermediary was having the bond put in proper legal shape; but in the delay, a neighbor, hearing of the transaction, made such representation regarding what he could do, as to break off all original negotiation and occasion correspondence that ended in nothing. It is asserted to be a case of "knock-out." As understood in California, and not wholly unknown elsewhere, the "knocker-out" is a man who, unable to successfully place mining property in his control, is determined, if he can help it, that no one else in his vicinity shall make a sale, and whenever he hears of any move toward the enlistment of capital in mines, makes such representation or misrepresentation as results in defeat, to the great detriment of the district so unfortunate as to have him for a resident.

A California Gold Mine.

(Continued from page 437.)

land and sinking a vertical shaft 1400 feet through the country slate, and north of the limits of the old workings. The same work had previously been accomplished by Thomas at the Kennedy mine in Amador county. A shaft was sunk there through the comparatively barren belt and struck a body of good ore below. This was an especially bold work to undertake at that time, for the depth of the gold bearing veins, as well as their permanency, was uncertain. Reducing the inclined depth of the shaft of the Kennedy to the vertical, the total depth of the mine reaches 2200 feet, the deepest vertical shaft in the State.

The Gwin Co. erected a complete water power hoisting plant and the shops in the summer of 1894. Sinking was steadily prosecuted for two years, until the 1000-foot level was reached. Drifts were run at the 700 and 1000-foot levels. At the 1000-foot level a well-boring machine was used to sink a prospect hole, in advance of the shaft work and down past the old drift. It encountered the north prolongation of the ore body at 1195 feet. This bore hole was sunk to the 1300-foot (vertical) level and happily just escaped the old drifts enough to ensure safety in sinking the shaft down near them. The shaft was then continued to the 1400-foot level and the work of opening up the ore body began on the 1200, 1300 and 1400 foot levels, where the vein in a great many places was over 20 feet in width of milling rock. As soon as these lower levels had been opened up and the levels connected, the ore was extracted, sent to the surface in large buckets termed "skips," and then run by hand cars into the bin of the 40-stamp mill, which in the meantime had been erected. An engraving of the mill on this page shows foundation, mortar blocks, water pipe and pressure box. The mill is run by water, which also supplies both power and electric light. In the north drift, at the 1400-foot level in the stopes, a rich vein about 2 feet wide, running through the main fissure, was encountered, full of free gold. The writer was present when a piece of quartz filled with free gold was taken out. The piece was about the size of an orange and afterward $2500 worth of gold was extracted from it. But it is not this rich specimen rock that keeps the mill going steadily, but the large bodies of quartz are yielding $3 and upwards per ton. The gold sulphurets now are all utilized. The percentage of these sulphurets is between 2 and 3 per cent and average from $60 to $100 per ton when concentrated.

As the south drifts in the 1200 and 1300 levels approached the old workings it became necessary to open them up and drain out the water. Several schemes were thought over, one to tap the old workings by diamond drill holes in the lower levels; but this necessitated compressed air for power. To run such a large hoist under 365 feet pressure, and the mill under 375 feet head, required at least 200 miners' inches of water every twenty-four hours. This was purchased from the Mokelumne Canal Co. at 15 cents per inch per day of twenty-four hours. This water was running to waste, but a plan was devised to put in a settling tank and carry it under pressure in a 15-inch sheet iron pipe 4500 feet to the bank of the Mokelumne river, where 380 feet effective pressure head could be obtained. A large Pelton water wheel, 19 feet in diameter, was then put in, and compressed air enough to readily generate 250 H. P. was obtained. This compressed air was sent back in a 6-inch pipe laid alongside the water pipe, not only to the settling tank, but 1670 feet farther to the old original south shaft. An air receiver was put in there, giving the power to pump out the water from the old shaft. Receivers for the air can be placed at any point where power is needed to perform general hoisting or any other work in the future.

The new 40-stamp mill has been going steadily since January, 1897, grinding out the ore and yielding a monthly dividend satisfactory to the stockholders, for it shows what the mine will do when thoroughly opened up. When the old south shaft is pumped out all the reserves of low-grade ore can be obtained, and, the capacity of the mill as well as the average of the ore being known, the profits can be calculated to a nicety.

Some idea of the extent and value of these ores can be obtained by taking an average section of any one of the mines along the lode, 100 feet in length by 100 feet in height. A rough estimate of this section, taking the average width of the vein at 20 feet, would give 10,000 tons. A 40-stamp mill grinds up 3600 tons of ore a month when running steadily, and this section of loose quartz would be crushed in a little less than three months. Now, take a general average of $5 gross yield per ton, and place the cost of mining and milling at $2.50. The profit on this ore would be $25,000 for the above time. This does not take into account any rich ore found from time to time, that is generally utilized in bringing the gross yield up to its usual standard, when for any reason it may be necessary to shut down the mill. In all of these large mines when the ore is blocked out it is simply a question of the capacity of the stamp mill going at full speed to realize a steady income. The principal mines of the mother lode, at the deep levels, have chutes of ore over 1000 feet in length, with varying widths—from 10 to 40 feet, and even more. It needs very little figuring to show that they will last for years, and while one level is being worked others can be exploited.

With permission of the Supt. of one of the mines mentioned, a statement is given for an average month of last year. During this month 116 men were employed, and the average assay value of ore sent to the mill was $7.50.

DISBURSEMENTS FOR ONE MONTH.

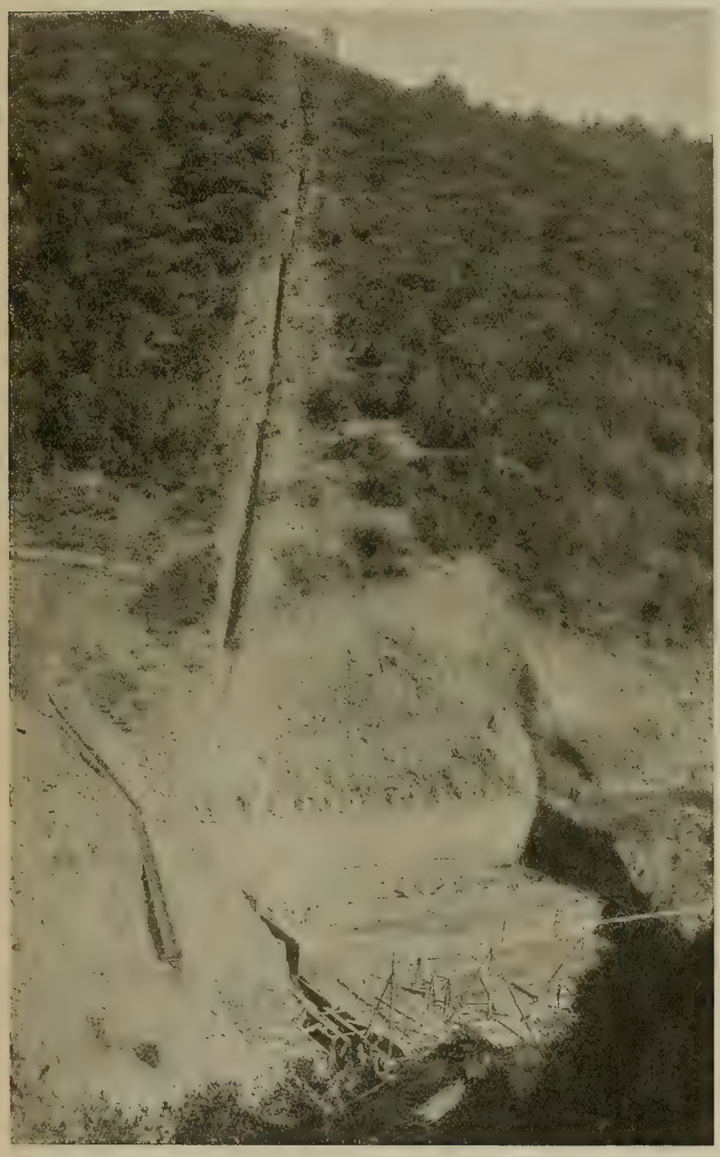
Mine labor	$ 7,833 45
Mill labor	640 00
Mine supplies	755 32
Mill supplies	315 59
Chlorination supplies	390 35
Timber and lumber	3,422 30
Assaying supplies	41 00
Water for power	1,551 75
Wood for power	115 55
Salary of superintendent	400 00
Salary of secretary	100 00
General expenses	67 25
Express charges (sulphurets)	10 50
Express charges "free gold" bar	64 00
Total	$15,707 06

During this month the mill receipts were $26,000, rent, etc., $300, a total of $26,300, leaving a net profit for the month of $10,592.94.

This is only an average report, and when one of these large ore bodies are properly developed, such returns can be regularly obtained steadily for years.

In the wheel-pit of the Gwin mine hoist a pressure of 365 feet is obtained by a total length of 840 feet of 15-inch sheet-iron pipe. The three-compartment vertical shaft, 12 feet by 9 feet in the clear, has been sunk to the 1400-foot level at an average cost of $36 per sinking foot. The hoisting machinery, new 40-stamp mill and all other expenses, except shaft sinking, aggregate $180,000. The air compressor plant (when completed) will probably cost $20,000. The ore is run through a crusher before going to the mill, making the quartz that is to be crushed by the stamps of uniform size. About 350 feet of railroad track connects the hoist and mill. The mine averages 30,000 gallons of water every twenty-four hours, which is readily handled with large skips, dumping automatically. Below the 1400-foot level there is a 40-foot pump, and reservoirs at convenient levels keep back the water accumulating in the drifts. The miners work eight-hour shifts, and their pay averages $2.50 per day. Each shift of men generally excavate about fifty tons of rock. The bin in the upper part of the mill has a capacity of 500 tons. The ore is run through the forty stamps, each of which, when "shod up," weighs 904 pounds and has a 6 to 8-inch drop. The stamps run day and night, and each stamp will crush three tons of ore in twenty-four hours. A 16-mesh screen is placed in front of the stamps and dies, and the pulp is run first on the outside plates, which have a general grade of 1¾ inches to a foot and are each 4 to 6 feet long.

These outside plates retain most of the free gold upon their silver faces. The residue lodges at the base of the screens, where the inside plates are placed. The outside plates are cleaned up every day, and the amalgam of gold and quicksilver squeezed into balls of convenient size to handle, through pieces of drilling or cloth. A few drops of cyanide of potassium and also quicksilver are rubbed on these plates before again replacing them in their proper position. After leaving the plates, the pulp is carried in wooden troughs to large concentrators or vanners, which pan out the sulphurets automatically. After concentration, the sulphurets are



FOUNDATION AND WATER POWER OF GWIN FORTY-STAMP MILL.



A TRESTLE ON THE COMPRESSOR LINE—GWIN MINE.

shipped to the chlorination plant to be roasted and the gold reclaimed from them. There are two concentrators for each 5-stamp battery at the Gwin mill.

At the end of each month there is a general clean-up of all the pulp in and around the stamp and dies. This pulp is placed in a barrel with some mercury, and revolved until the mercury has thoroughly penetrated the mass. The amalgam is worked down and afterwards treated by a method similar to that used on the plates, until all the amalgam is collected in convenient shape to be retorted. The slimes that leave the mill are assayed from time to time, and if they show value to any extent, are again caught up and run over stationary canvas tables, placed on grades sufficient to allow the slimes to slowly run off. Such treatment is sometimes quite lucrative, and it is not uncommon for some of the mines to sell the privilege of washing these slimes to contractors for over $1500 per month.

The retort house is fitted up with a closed and an open furnace. The former is used to heat the amalgam until the quicksilver is condensed. The vapor passes through a cooling tube until again converted into liquid mercury. In this operation only a very small percentage of the quicksilver is lost. The rough masses of gold left in the retort are then taken out and all melted together in a crucible in the open coke furnace. After a thorough melting, the gold is moulded into bricks and sent to the mint or smelter. An assay of the gold brick is made at the mine office as a check upon the refiner. This rough gold varies, but is generally worth from $16 to $18 per ounce.

The canyon or gulch in which the Gwin mine is situated is very steep and narrow. Recently it became necessary to build a flume from the south shaft down the gulch and under the main dump. This carries the water through the canyon and prevents the dump from caving. This flume is built large enough to carry easily the heavy streams of water rushing down the gulch during the severe winter storms. The air-compressor line is also flumed where it crosses the gulch. Altogether, the work of the company is done thoroughly and is justified by the present encouraging developments.

The Gwin mine is a close corporation, controlled by a few vigorous mining men, who personally overlook the work. They control the entire stock and none of it is on the market, the few shares offered having been subscribed at the time of organization. It is typical of modern ingenuity and skill, and its history is a history of California since the gold discovery.

At the annual meeting of the Gwin M. & D. Co. last week, Supt. Thomas reported that near the north end of the 1400 level a winze struck into 50 feet of ore running from $5 to $6 a ton. The water has been taken out of the old or south shaft to a depth of 1009 feet. The ore available at present is very low grade. During the year the amount of ore worked was 48,180 tons, the net return on which was $168,-823.79 in bullion and $39,963 35 in sulphurets. The election resulted in the choice of M. W. Belshaw, Pres.; E. C. Voorheis, Vice-Pres.; C. C. Eells, F. F. Thomas, D. McClure, additional directors, and J. J. Crawford, Sec.

Treatment of Slimes.

NUMBER III.

The Precipitation of the Gold.—It will be noticed that in the foregoing operations we have reversed the ordinary methods of metallurgy. In every other metallurgical operation, successive concentration is the means by which we finally obtain the metal, for which we are working; but in this case we pursue the opposite course. The final operation of winning the gold takes place from a grade of material worth less per ton than was the material with which we started. We have simply changed the physical condition of the gold from the state of a solid into that of a liquid, and it is with this diluted liquid that we have now to deal. Precipitations of metals from solutions present many curious and interesting problems, and one of these is that with the same reagents it is very much more difficult to produce perfect precipitation from a very dilute solution than from a concentrated solution. There are certain chemical and physical laws in connection with this question which I do not think are very well understood. For instance, in precipitating gold from a solution of its chloride by means of ferrous sulphate, a fairly rich solution containing one to four ounces of gold to the ton admits of a very perfect precipitation, if sufficient time is given for settlement, more especially when there are few other metallic salts in solution. A similar solution, but containing only one or two dwts. to the ton, allows of very imperfect precipitation, by ferrous sulphate. This is only one of many illustrations that could be brought forward in connection with chemical precipitation, wherein the results obtained differ widely from what might be expected. In electrolytic precipitation we have a different set of laws governing the electro-deposition of metals from those which operate in chemical precipitation. In the course of our experiment on the precipitation of dilute cyanide liquors we have tried many methods of precipitation solutions containing six to twelve grains of gold per ton, but failed completely with such dilute liquor; whereas the same methods acted perfectly on five dwts. or ten dwts. solution. With a dilution of gold down to six dwts. per ton, which is about one part in 100,000, it would be natural to think if it was one part in 100,000, or one part in a 1,000,000, or one part in 10,000,000, there would not be very great difference in the resistance of such very minute proportions of dissolved gold to precipitation, whether by electro-motive force or by chemical reaction; but the difference between the action of a liquid containing six dwts. per ton and one carrying six grains per ton is most marked, both in chemical precipitation and in electrolytic deposition. In general we have found that we could effect the precipitation of gold in these dilute solutions best, and most economically, by means of electrolysis. We have found that we are more independent in this method of dilution of the gold, and that varying chemical constituents do not have to be looked after quite so closely. It is independent of the amount of cyanide contained in in the liquor, and precipitation takes place whether the solution is alkaline or acid.

The principal points in electrolytic precipitation that it is desirable to study are the amount of current per square foot of anode and cathode, and the time the current is exerted, taken in conjunction with the value of the solution. One of the first points requisite in the electrolytic deposition of gold is that the liquor shall contain no solid matter; that is to say, that it shall be absolutely clear. Otherwise, the great surface which is presented by the cathodes and anodes serves to collect all the fine particles that remain in the liquor; necessarily settlement of any kind upon the metallic surface of the anode or cathode increases the resistance of the precipitating box and results in imperfect adhesion of the particles of the gold to the cathode. This difficulty is easily overcome by passing the liquid before precipitation through a sand filter, or through an intermediate settling vat of large capacity. An example of a good filtering device may be seen at the Central Works of the Rand Central Ore Reduction Company, or at the Simmer and Jack slimes plant; also one of large settling capacity may be seen at the Geldenhuis Estate. The liquid which is drawn from fresh slimes is much more readily clarified than the liquid drawn from accumulated slimes. The liquor from accumulated slimes contains a considerable amount of iron and lime salts in solution, and the settlement of the fine clayey particles is retarded. This may possibly also be due to the organic matter which it contains.

Other substances in the liquid which affect the surface of the cathode are those salts which are in solution upon entering the box and are there deposited on the large surface exposed, or are electrolyzed. Lime which has been used for settlement, and also to neutralize acidity, is in the form of carbonate of lime, sulphate of lime, and hydrate of lime. This precipitates partly as carbonate and partly as sulphate upon the cathodes and anodes, more especially on the former, and, to my mind, is precipitated partly by means of the electrolytic current. Then there are the products of the decomposition of the solution itself, which (in the case of iron salts, resulting from the decomposition of the pyrites in the ore) are separated in the form of Prussian blue and hydrate of iron. Then, again, there are the products of the decomposition of the anode plates.

The clearness of the solution depends largely upon the solution of the anode. The iron plate anode in use to-day in the Siemens and Halske boxes, with properly proportioned current, is a very perfect anode, easy to be obtained in any quantity, and as easily manipulated and secured in the boxes. With a current density as low as 0.03 or 0.04 amperes per square foot, very little decomposition of the iron anode takes place. An anode three-sixteenths of an inch in thickness and with a current density of 0.035 amperes per square foot should last for five years and possibly much longer. There seems to be a limit of current density up to which an iron anode will show very little corrosion, but beyond that point oxidation seems to take the place more rapidly than the proportionate rise of current density would indicate. Where the division and tension of the currents has been very carefully studied and regulated very little decomposition of the anode need take place.

With the peroxide of lead anode which was discovered by Mr. Emile Andreoli in the early part of 1895, practically no corrosion of the anode plate takes place, and although up to now this anode has only been used in a small way, I feel confident that its introduction into this country on a large scale would prove satisfactory. With perfectly filtered solutions and with peroxide of lead anode, working with fresh slimes, and by watching carefully the amount of lime added to the slimes, there should be very little trouble in maintaining a perfectly clean anode surface for the planting of the gold. One point worthy of study by all chemists in connection with the maintenance of a clean anode surface is to see either how the lime salts can be prevented from precipitating in the boxes, or if any economical method could be devised to reduce the amount in solution. I think it is next to impossible to find any substance that would economically replace lime in the settlement of slimes, but some means might be found to obviate its deposition from the solution in the precipitation boxes. The subject of the production of suitable anodes for precipitation of gold from cyanide solutions is probably not exhausted, but the field has been very thoroughly explored by able electricians and chemists, and, beyond the two anodes mentioned, I do not know of any that will fulfill the required conditions.

(*To be Continued.*)

Purification of the Electrolyte in Copper Refining.*

The systematic control of the composition of an electrolyte for copper refining is requisite, to avoid the deposition of foreign metals at the cathode whereby the quality of the copper would be impaired, and to maintain the strength of the electrolyte at its proper point. The copper content of the electrolyte tends to increase, because the copper at the anode dissolves rather more quickly than it would if its rate of dissolution were strictly proportional to the current. This is due to the fact that copper exposed to the joint action of air and sulphuric acid slowly dissolves, irrespective of its function as an anode; copper containing oxide will, of course, dissolve faster than the metal free from this body and dependent for its oxidation on the presence of atmospheric oxygen. The proportion of copper thus dissolved to the quantity of copper dissolved electrolytically will be greater the smaller the current density and the more vigorous the circulation and consequent aeration of the electrolyte. Spontaneous evaporation—not to be neglected when the electrolyte is used slightly warm, e. g., at 30° C. to 40° C. = 86° F. to 104° F.—also tends to increase the concentration of the electrolyte, and thus it comes about that there is a continual tendency for the quantity of copper sulphate in the tanks to augment until an elimination of a portion of it is a necessity. It is evident from this that the purification of the electrolyte should be accompanied by a withdrawal of a portion of its main constituent, copper sulphate.

At the copper refinery of the Baltimore Copper Co. about one-fifth of the electrolyte is removed from time to time to be worked up for copper sulphate, and a suitable (but not necessarily equal) amount of pure copper sulphate solution is added, so that the content of the electrolyte in impurities is diminished, and, at the same time, the strength of the electrolyte in copper sulphate is adjusted to its normal value. The importance of this regulation lies in the fact that in a large refinery containing a multitude of small units of plant it is essential for smooth working that the conditions of current density, resistance of solution and the like should be maintained as nearly uniform as possible. It is for this reason that any process of purification which would regenerate the electrolyte continuously, instead of periodically, would present many advantages.

Using this method, the Baltimore Copper Co. produce a considerable quantity of copper sulphate, which is sold with profit to the Western Union Telegraph Co. The final liquors are precipitated with iron scrap to recover the last portion of copper, amounting to 2 or 3 per cent.

At the works of Guggenheim Bros., Perth Amboy, N. J., the liquor is run into lead-lined vats and boiled with scrap copper with free access of air, so that the copper may be dissolved, the free acid neutralized, and the solution so enriched in copper sulphate that it can be readily crystallized to yield this salt. The copper sulphate is deposited on lead strips hung across the crystallizing tank. The mother liquor contains almost the whole of the antimony and arsenic, together with a small quantity of copper. The latter is precipitated by iron plates, on which the arsenic is also deposited as soon as the copper has been thrown down. Ultimately a black precipitate, containing as much as 60 per cent of arsenic, is obtained. This may be worked up either for crude copper or for the production of arsenic compounds, such as Scheele's green, paris green and white arsenic. In the Chicago Copper Refinery the bulk of the copper sulphate is recovered by crystallization, and the mother liquor is boiled down to a point at which both copper sulphate and arsenious acid crystallize out. The mixture is extracted with just enough water to dissolve the copper sulphate, which, being thus fairly freed from arsenic, is returned to the vats.

In the foregoing cases a part of the whole of the electrolyte is worked up for copper sulphate, and this purified recovered salt is returned to the process. Other methods have been proposed for the direct elimination of the chief impurities in the electrolyte and its restoration to a proper working condition without recourse to crystallization of the whole quantity of copper sulphate. These include boiling the liquor with metastannic acid to precipitate arsenic, filtration of the liquor through a layer of cuprous oxide, which is a base strong enough to precipitate most foreign metals as hydroxides, and oxidation of some of the impurities, notably iron, by aeration, and constant precipitation of certain other impurities, e. g., arsenic as ferric arseniate. All these methods, singly and conjointly, have met with

*Condensed from the London Electrician.

very poor success. Purification by means of tin added to the copper before it is cast into anodes, in the proportion of 2.5 pounds per ton (say, 0.1 per cent), has also proved of only moderate utility. When the copper is very arsenical, the tin, in dissolving, appears to retain the arsenic in the anode sludge, when it is less objectionable than in solution in the electrolyte; the presence of tin in the anode also makes the deposited copper smooth. These advantages, however, are not sufficient to make the application of the process generally remunerative.

One of the best methods of purification consists in electrolyzing the liquors from the depositing vats with a current density so high that all impurities save iron are deposited pell-mell with the copper. The operation is carried out in purifying tanks, of which a set of twelve is allotted to about 280 depositing vats. The cathodes in the purifying tanks are of sheet copper and the anodes are of lead. The process needs a somewhat large expenditure of current, and produces a good deal of impure copper; but it has the advantage that the copper is recovered as metal, which, though impure, is often more salable than is copper sulphate. The electrolyte, purified as regards arsenic and antimony, impoverished in copper, and still containing iron in solution, is brought up to strength with fresh copper sulphate and returned to the depositing vats, its purification and return being repeated until the iron accumulates to an inconvenient extent, when the liquor is finally worked up for copper sulphate.

The variety of these methods makes it abundantly evident that there is no "best" or even standard process of purifying copper electrolytes, and that the merits of every suggested procedure must be considered, not only from a chemical and technical point of view, but also with regard to local demands for by-products, such as blue vitriol and crude copper, and to local abundance of supplies of raw materials, such as sulphuric acid, scrap copper and the like. A process torn up by the roots, and transplanted to a distant site with different local conditions, is not likely to prosper.

Pumping for Irrigation *

By S. W. LUITWEILER, Los Angeles, Cal.

In southern California all the water obtainable by natural flow has been appropriated. There remains but one other source whereby a sufficient quantity can be had for irrigation purposes, and that is by means of wells, either dug or bored. In what way shall we raise a sufficient quantity to meet our demand?

Centrifugal Pumps.—When an abundant supply can be lifted without going to a greater depth than 40 feet, the centrifugal pump is without doubt the best pump for this duty on account of its cheapness and simplicity. It requires but little care—is always ready for use. While the best centrifugal pumps do not range over 50 to 60 per cent efficiency, varying according to the work, still they have so many good features that they cannot be overlooked for any work within their range. There are two classes of centrifugal pumps. The horizontal, adapted to work within 25 feet suction, is placed upon the surface ground and is quickly and cheaply connected to the driving power by means of a belt. The other—the vertical centrifugal—can be placed in a pit, taking care to submerge the pump runners under water in order that the pump may be always primed and ready to start. When the water to be lifted is to be had by a bored well at the bottom of a pit, the suction pipe may be dropped into the well pipe to a depth of 25 feet. The vertical shaft from the pump below, extending to the surface of the ground, or a little above, carries the pulley which drives the pump. Centrifugal pumps may be made to deliver water up to 100 feet economically by delivering the water from one pump to the other, either vertically or horizontally. This is seldom done, as the conditions under which they may be operated rarely present themselves. Taken under all conditions, when they can be used for the raising of large quantities of water cheaply, and considering the low cost and long life, the centrifugal pump is always to remain the favorite. By this I mean, of course, the best makes of centrifugal pumps.

Somewhat similar in operation to the centrifugal is the rotary pump; but on account of its short life and friction in its moving parts it is not used much.

Deep Well Pumps.—The other class of wells, which do not come within the range of centrifugal pumps, and which are generally located along the foothills or on the mesas, are known as deep wells, and require special pumps. Until lately this class of wells were operated wholly by plunger pumps, worked by cranks, either single or double acting. The single-acting pump is one of low efficiency, and for lifting large quantities of water is wholly unsatisfactory. There are several styles of double-acting pumps, all constructed for the purpose of throwing a constant stream; some do, others do not. The best of this class of pumps are those which do the work on the lifting stroke, as they have a greater range, and the pressure employed to do the work is against the foundations.

Compressed Air.—Another method of raising water is by compressed air. Under certain favorable conditions this system works well, but in many cases will not work at all. When a group of wells owned by one party are to be pumped, and when the water is not too far below the surface, it is the best system to use, as it would be expensive to pump a number of wells by putting separate pumps and power to each well. I made some experiments some years ago in pumping single wells by compressed air, but saw nothing to warrant the use of air for this purpose. Upon investigation, I found the best methods for performing the work covered by patents which are still in force. The only way left to lift water by compressed air, and not patented, is to blow the water out of the well pipe by the volume of air. This plan is not very efficient, as the air can escape through the joints in the pipe, and, as we use short lengths of riveted pipe in our wells, making no pretensions at getting close joints, this plan is more or less wasteful. Air is very hard to control, and the joints must be much tighter than is used to convey water, as a very small leak will pass a large quantity of air under pressure. While the air-lift people claim no valves are used in the well, there are several used in the air pumps and of a more delicate nature than is used in water pumps. The Pohle, Titus and other patents cover the right to use a separation pipe for the delivery of the water. This pipe extends down into the well, as does also the air pipe, which delivers the air into the water pipe at the bottom. In operation, the air arranges itself into air pistons, with water pistons, alternately an air piston and a water piston throughout the whole length of the discharge pipe. This patented air lift system has a much greater efficiency than can be had by other methods using air, and is considered the best means of lifting water from a group of wells at one time; but I would not recommend lifting water from single wells where pumps would do the work, first, because of its higher cost; second, because air compressors are very delicate machines, the pistons have very little clearance in the cylinders, and often the use of too much lubricating oil will cause them to hammer or pound; third, they should be used only in a well-built room, free from dust, as dust or grit soon cuts them out, and this country is very dusty at the season of the year when we need water for irrigation; fourth, air compressors must necessarily work very close in order to pump air, which is the thinnest substance with which a pump has to deal, and leaky air pumps are hard to conquer, and the loss in efficiency is much greater than that with leaky water pumps.

Gas Engines.—A good gas engine working on distillate will produce horse power for about 1 cent per horse power per hour. They are automatic in their operations and require little attention. I have known engines to work day and night for a week without stopping, while the attendants, having the three engines in charge and located a block apart, did not visit the engines oftener than two to three hours, and then to oil them. Using steam requires the constant attendance of the engineer as a matter of safety, the cost of fuel is double, and when boilers are used the wear and tear is considerable, as well as loss in time of getting up steam. The water used in boilers here soon forms a deposit on the tubes and it is hard to keep up steam. To keep the tubes clean and free from this formation is no small expense. Electric power will soon be an important factor in irrigation, but I doubt if its use will become general, as the cost of poles and wires to carry the current will not admit of going much distance from the main line.

* Condensed.

Some New Blacksmithing.

On Market street near Fifth, San Francisco, for several weeks a crowd rivaling in numbers the groups in front of the war bulletins has gathered to see a man in a window heating a bar of iron a cherry red and then hammering on it on an anvil. The wonderful part of it is that he heats the iron by thrusting it into cold water. This does away with all that we have associated with the work of hammer and anvil, the shop, the forge, the coals, blaze, bellows, etc.

The tank holding the cold water is about 3½ feet square. The water is about 2 feet deep. Two insulated wires from an electric dynamo are led into the room. The positive wire is connected with the metal lining of the tank. The other wire is secured by welding or solder or otherwise to a pair of tongs whose handles are covered with insulating material. The negative wire is long enough and flexible enough to allow considerable movement by the workman. The latter grasps with insulated tongs the spike, bolt, horseshoe or other object which is to be heated and dips it into the liquid. That's all. When it is hot enough he turns to his anvil and hammers the thing or drops it where another workman can pick it up, and then uses his magic tongs afresh to handle something else. Heating iron or steel to a cherry red by simply plunging it into cold water keeps the crowd as long as the man does it, and no wonder.

The Worst of the Dry Years Since 1850.

How bad the current year really is as compared with other bad years is shown by the diagram on this page, prepared by Prof. George Davidson of San Francisco and published in the *Daily Commercial News*.

San Francisco.

Table of the four wet seasons of very small Rainfall, between 1849 and 1898.

Wet Seasons	Total inches of Rainfall each season.	Days on which Rain fell.	Depths in Inches	Months: July	August	September	October	November	December	January	February	March	April	May	June.
1850-'51	7.40	51	0 1 2 3												
1863-'64	10.08	37	0 1 2 3												
1876-'77	10.00	46	0 1 2 3 4												
1897-'98 to the 18th of April 1898	7.75	45	0 1 2 3												
Average for 4 seasons	8.81	45	0 1 2												
Average of 48 seasons	23.70	66													
Largest in 1861-'62	49.27	83													

Geo Davidson

The table gives the monthly rainfall for the four wet seasons of 1850–51, 1863–64, 1876–77 and the present 1897–98 to date. The wet season is reckoned from the first of July of a given year to the end of June of the next year, and the wet seasons referred to are the driest recorded. The data used for the earlier years are from the observations of Thomas Tennent, 1849–90; and for the later dates, from the records of the Weather Bureau.

There is a chance yet for a little rain in April and May, counting by what fell in 1851 and 1864, but there is also as good a chance that April and May may be as dry as in 1877.

The figures are for San Francisco, and therefore have only a relative significance for the balance of the State, and yet every inch of rain that falls at San Francisco is represented by a large or small factor in every locality in the State, and on the average may be said to represent not less than $3,000,000 per inch in gold coin.

THIS paper understands the term "bullion" to mean uncoined gold and silver, and nothing else.

THIS month, at Houghton, Mich., the greatest mining shaft in the world has begun operation. After nine years of continuous work and an expenditure of over $2,500,000, the Red Jacket shaft of the Calumet & Hecla is now an integral part of the great copper mine, which pays quarterly dividends of $1,000,000, and is steadily producing conglomerate rock, carrying approximately 5 per cent of native copper. The Red Jacket shaft is vertical, all other shafts of the Calumet & Hecla following the dip of the lode, 37½° to the west of northwest. It was started in 1889, immediately after the last of the three great fires occuring underground in the older workings of the mine, which did damage of more than a $1,000,000. Work has been continued upon it night and day since that time, and the shaft stands without an equal in any mining field on the globe. It is 4900 feet in depth—but 380 feet less than a statute mile. It contains six compartments, each equal in size to an ordinary mining shaft, four of which are used for hoisting rock and lowering timber. One shaft is utilized for the ladderways, and the sixth and last compartment carries the wires and pipes for telephones, light, power, water and compressed air. The underground workings of the shaft are laid out with mathematical accuracy, the undeviating course of the copper bearing lode allowing the work to be planned thousands of feet ahead of the miners' picks. The great pumps which free the mine of water are incessantly operated interchangeably by compressed air and electricity. The power drills which eat the holes for dynamite cartridges, are run by compressed air alone, and there are more than 300 of these drills, each doing the work of a dozen men, working both day and night in the Calumet & Hecla mine. With a rock temperature of 87° Fahrenheit at the 4900 foot level, the cooling effects of the air from the drills is grateful.

SOME TIME ago inquiry was made of this paper regarding an oil made from maize or Indian corn, and after considerable inquiry on our part it is learned that a concern manufacturing glucose in Chicago, Ill., produces what is called "corn oil." It is extracted by pressure from the germ of the grain by a method similar to that used in the manufacture of linseed oil, leaving a residuum not unlike the oil cake of commerce. In the manufacture of glucose it was forced necessarily to first extract the germ. This, for a long time, was a waste. Now this company produces 350 barrels per day of corn oil. This oil is shipped in second-hand oil barrels; weight, filled, 400 pounds each. The price at the factory is 3 cents per pound. It is mostly shipped to England, where it is used in the manufacture of soap, though some of it is used in Chicago, mostly in mixing cheap paint. It is called a rapid drying oil. It is also used to adulterate linseed oil.

Recently Declared Mining Dividends.

Alice, Montana, 5 cents per share, $20,000; payable immediately.
Sacramento, Utah, 5 cents per share, $5000; payable April 30.
South Swansea, Utah, 5 cents per share, $7500; April 21.
South Eureka, California, 2 cents per share, $6000; payable immediately.
Mercur, Utah, 18 cents per share, $36,000; April 20.
Elkton Con., Colorado, 2 cents per share, $25,000; April 21.
Pioneer, California, 12½ cents per share, $12,500; payable April 26.
Alaska-Mexican, Alaska, 10 cents per share, $18,000; payable April 28.
Alaska-Treadwell, Alaska, 37½ cents per share, $75,000; payable April 28.
'76 G. M. & M. Co., Colorado, 2 cents per share; April 19.
Gold Coin, Colorado, 1 cent per share, $10,000; payable April 25.
Ruth mine, British Col., 75 cents per share.

Recent California Mining Incorporations.

Coarse Gold M. & D. Co., Fresno; capital stock, $60,000; subscribed, $12,000; J. J. Seymour, J. W. Cate, J. L. Maupin, C. A. Shattuck, L. H. Smith.

San Domingo M. Co., San Francisco; capital stock $500,000, subscribed $125; E. C. Kemble, A. E. Shaw, J. A. Allen, C. W. Edgecombe, R. H. Delafield.

Coast Industrial Notes.

—Over 500 carloads of lemons will be shipped from California this season.

—California sheep by thousands are being shipped to Utah, New Mexico and Texas to escape starvation from drouth.

—The California Asphaltum Co. of Ventura county has shipped its first carload of sulphuric acid, containing thirty tons, to Los Angeles.

—At present prices the owner of hay is as well off as though he had a paying gold mine. It is probable that importations may reduce the price later on.

—One of the effects of the California drouth this year will be additional interest in mining—the only State industry that has had any promise of profit in recent years.

—The trip of the battleship Oregon from San Francisco around the Horn to the Atlantic coast is a great argument for the Nicaragua canal, built, owned and operated as a national measure.

—From San Bernardino county it is satisfactorily reported that the litigation which has practically tied up the Nevada Southern, sometimes called the California Eastern, has all been cleared away, and Gen. Mgr. Siebert now confidently expects to be able to build to Goode Springs this summer, a distance of fifty miles.

—At Stockton, Cal., spot wheat has reached the highest price. One lot of 1500 sacks brought $1.75 per cental, and the mills are paying $1.70 to $1.72½ for milling wheat. Farmers think they will secure $2 for their wheat, as there will be but little of it raised in this State this year. The farmers in the vicinity of Stockton have about 26,000 tons in their possession yet.

—Writing to the State Department of the shipment of 1,200,000 feet of lumber from Puget sound to Corea, Horace N. Allen, consul-general to Sheol, says: This is the first direct shipment of United States timber to Corea. It is for the use of the Sheol-Chemulpo railroad, now being rapidly built by United States capital. Ties for immediate use will have to be obtained from Japan.

—A Fresno, Cal., dispatch says: Unless something at present entirely unforeseen happens, fully 100,000 head of sheep and cattle will die of starvation in that county alone, in the next few months, on account of the lack of grazing grounds. Urgent representation has been made to Senator White asking that the Sierra reservations in that part of the State be thrown completely open to sheep and cattle this year with no restriction as to the National parks.

—Coal discoveries and developments are numerous in California this month. In Lake county, near Lakeport, a 50-foot tunnel cuts four veins, one said to be 10 feet, which is doubtless an exaggeration. At a depth of 54 feet a small vein has been struck between Oakdale and Sonora. Near Cordelia a vein of soft coal is also reported uncovered. The Coral Hollow mines are producing a large quantity, which finds ready sale in San Francisco at $6.50 per ton, retail.

—The *Lumberman* says the demand from South Africa for lumber from this coast has subsided. Two years ago Delagoa bay promised to buy large quantities and started in by purchasing a good many million feet. All at once shipments ceased. It was alleged that rumors of war between the Boers and English were depressing trade. Recently, however, shipments are being made from the Baltic, which are reported to be quite extensive. If this continues there should be missionary work and education carried on in Africa.

—The engineer's office of the War Department has sent to the California Board of Public Works permission for the prosecution of the river work under the State appropriation for the improvement of the Sacramento and San Joaquin rivers. Colonel MacKenzie, in charge of such work, has notified the California authorities that the carrying out of the plans for cut-offs 6 and 7 of the San Joaquin river will be in accord with the general plans of river improvement, and that the use of State forces to carry on the work will be agreeable to the National Government.

—The Manufacturers' and Producers' Association this week issued a statement showing comparative railway rates, east and west bound, on some leading Pacific coast products, many of which are shipped in large quantities from this coast. For instance: Agricultural implements, eastward, $3.70; westward, $2.40; cotton bags, eastward, $3 30; westward, $1; leather belting, eastward, $2; westward, $1; boots and shoes, $3.40—$1.50; butter in cans, $2.40—$1; canned salmon, $1.70—$1; green fruit, $3.40—$2.40. The large figures indicate the cost of freight from Pacific coast terminals to Chicago or New York; the smaller, the rates from those points to San Francisco. The traffic committee of the association reports: "The matter of discrimination and inequalities of freight rates affecting the interests of the manufacturing and producing industries of the coast has claimed the attention of our association frequently during the past year, and the presentation of facts relating thereto is now brought before the managers of the transcontinental railroads with the belief that relief will be granted, and that fair play will be given to the Pacific coast industries. The Manufacturers' and Producers' Association of California represents over 500 of the leading manufacturers and distributors." A letter was sent to each member of the association, which says:

We beg to call your attention to the injustice and discrimination against the manufacturers and producers of California by excessive rates of freight at present in effect from San Francisco and other Pacific coast terminals east bound, as compared with the west bound rates on the same commodities from Chicago and New York to San Francisco and other Pacific coast terminals.

Under existing conditions the manufacturers and producers of California are unfairly handicapped in their efforts to obtain a market for their products, as against the manufacturers and producers of Eastern States, on account of the great disparity of rates now existing on the same products east and west bound.

Your traffic committee has compiled a comparative statement, which we herewith inclose, showing the east and west bound transcontinental rates on some of the Pacific coast products. Taken generally, this statement shows the east bound rates to be from 10 to 100 per cent greater than west bound rates on the same commodities.

Our State stands well in the front ranks of the great producing States of the Union, not only as to products of the soil, but in its manufactures, and it is eminently unfair and unjust that we should not receive the same consideration at the hands of the transcontinental lines as is accorded the manufacturers and producers of Eastern States.

It is desired by your committee to add to the inclosed statement the rates of all commodities handled by our members, and we would ask each and every member to communicate with this committee, giving existing rates, yearly tonnage, etc., of such commodities as they are interested in, at the same time pointing out such inequalities as exist and suggesting what recommendation should be made.

It is of great importance that our members give this matter their immediate attention, as your committee will have to compile the data received and present our petition to the Transcontinental Freight Bureau, who meet at Milwaukee on May 10th next.

In order to secure a proper hearing and correction of the existing inequalities in existing transcontinental freight rates and classification, which, as at present constituted, work so disadvantageously to our Pacific coast interests, it is absolutely necessary that all manufacturers and producers of this State should stand firmly together, and by united effort, if necessary, the routing of all their freight, both east and west bound, over the line or lines that will give proper and reasonable consideration to our Pacific coast interests. We are confident that much can be accomplished toward securing an enlarged, profitable trade area for our Pacific coast manufacturers and producers.

In presenting our petition to the transcontinental roads we must give them absolute facts as to the tonnage east bound that now exists or can be created by reasonable rates on California products; hence the request to you that you inform us fully regarding your line of business, so that our petition will be comprehensive and accurate. Respectfully yours,

Edw. Everett, chairman; Frank L. Brown, W. F. Bowers, James W. Kerr, Charles R. Allen, J. A. Folger, C. P. Rossi, Traffic Committee.

Personal.

M. P. Boss of San Francisco is at Vera Cruz, Mexico.

C. JACKSON becomes Supt. Gold Blossom mine, Auburn, Cal.

J. M. BUFFINGTON becomes Supt. McGibbin mine, near Magalia, Cal.

R. S. RAW, Supt. Septimus D. Co., Placerville, Cal., is in San Francisco.

G. W. STARR has been appointed Gen. Mgr. Empire mine, Grass Valley, Cal.

J. C. HOPPER, Mgr. Uncle Sam mine, French Gulch, Cal., is in San Francisco.

D. R. OLIVER, owner of the Harriman mine, Sonora, Cal., is in San Francisco.

F. W. WILMANS, Pres. Rose Creek M. Co., Sonora, Cal., is in San Francisco.

PROF. J. E. KEELER has accepted the directorship of the Lick Observatory.

S. C. WILMANS, Supt. Boulder mine, Shingle Springs, Cal., is in San Francisco.

W. H. CLEARY JR., Supt. Petticoat mine, Railroad Flat, Cal., is in San Francisco.

D. FRICOT, Grass Valley, Cal., is at Fricot City inspecting his Mother Lode mines.

H. MCCORMICK has been appointed Supt. Black Diamond mines, Tombstone, Ariz.

M. MIERSON, owner of the Mierson Con. mines, Placerville, Cal., is in San Francisco.

D. H. JACKSON, owner of the Salisbury mine, Placerville, Cal., is in San Francisco.

B. MASON of the Newton M. Co., Placerville, Cal., has returned home from San Francisco.

N. W. MOUNTAIN, part owner of the Newton mine, Placerville, Cal., is in San Francisco.

F. CHAPPELET, Supt. Mayflower mine, Forest Hill, Cal., has returned to the mine from Oakland.

T. JAMES, Supt. Shorty Hope mine at Jacksonville, Oregon, has returned home from San Francisco.

C. H. WEATHERWAX, part owner Bob Red mine and Sec. El Dorado County Miners' Association, has returned to Placerville from San Francisco.

G. MAINHART, Supt. Omaha Con. mine, Grass Valley, Cal., has returned home from San Francisco.

T. KEARNS, managing owner Silver King mine, Park City, Utah, has returned to the mine from San Francisco.

Commerical Paragraphs.

THE Jeanesville Iron Works Co., Jeanesville, Pa., and Denver, Colo., are shipping two compound condensing mine pumps, 1000 gallons capacity per minute, to Japan.

THE Westinghouse Electric Co. has a Government order for $700,000 worth of generators, motors, dynamos, etc., to be used for the installation of light and power plants on vessels now being equipped for Government service. The company will receive a bonus of $25,000 for quick delivery.

SUPPLEMENT No. 2 to Catalogue No. 2, third edition, "Specifications of Mining and Milling Plants for Prospecting and Developing Gold Quartz Mines," of practical value and interest to every miner, issued by the Joshua Hendy Machine Works, 38-44 Fremont street, San Francisco, Cal., and sent upon application to any address.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING APRIL 12, 1898.

602,301.—PIPE SLITTER—A. J. Bramlette, Downey, Cal.
602,055.—BED—T. H. Campbell, Seattle, Wash.
602,153.—WINDMILL REGULATOR—W. P. H. Campbell, Stockton, Cal.
602,209.—ROOF BRACKET—D. Cleland, Oakland, Cal.
602,213.—POLISHING DEVICE—G. H. Dyer, S. F.
602,130.—CARPENTER'S TOOL—B. Fuller, Sacramento, Cal.
602,319.—WAGON BRAKE—J. A. Gilkey, Springfield, Or.
602,161.—MOTIVE ENGINE—A. Howard, S. F.
602,221.—CRUSHING MILL—H. L. Jessen, Watsonville, Cal.
602,135.—PIANO—J. C. King, S. F.
602,191.—DILATOR FOR FINGERS—R. A. Lucchesi, S. F.
602,345.—FEED CUTTER—A. Mattijetz, Los Angeles, Cal.
602,139.—RIVET MACHINE—L. E. Miller, Los Angeles, Cal.
602,170.—AIR VALVE—E. A. Rix, S. F.
602,144.—LOCK—W. D. Roberts, Portland, Or.
602,198.—COMPRESSED AIR HAMMER—J. Schmidt, Rio Vista, Cal.
602,145.—HAY RAKE—R. A. Simpson, Florence, Cal.
28,468.—DESIGN—W. E. Gregory, Astoria, Or.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

GRINDING AND POLISHING DEVICE.—George H. Dyer, San Francisco, Cal. No. 602,213. Dated April 12, 1898. The object of this invention is to provide an apparatus which is especially designed for grinding and polishing surfaces, and in a mechanism by which the apparatus can be moved from side to side, forward and back, tilted and generally adjusted to any surface or contour upon which it is desired to operate. It consists essentially of a suspending rod, a main frame having one end carried thereby, disks or grinders journaled and supported in the opposite end adapted to rest upon the surface to be ground or polished, a flexible driving belt and direction pulleys over which it passes, and through which power is transmitted to actuate the grinding disks and means to connect the carrying device with the frame and adjustable collars for varying the length and tension of the belt. Anti-frictional bearings are so disposed as to support the grinding disks and limit the cut as well as to insure its being leveled, and these devices have means for adjustment up or down. The main frame is also caused to oscillate transversely while being advanced so as to cause the grinders or cutters to work over a given amount of space while doing the work. The framework in which they are journaled may also be tilted or turned and adjusted so that the cutters will work upon any desired angle.

COMPRESSED AIR HAMMER.—Jacob Schmidt, Rio Vista, Cal. No. 602,198. Dated April 12, 1898. The object of this invention is to provide an apparatus in which the air can be first compressed to a high degree, then delivered suddenly into a cylinder having a plunger and connecting rod through which the hammer is actuated. The invention consists of a cylinder having a piston movable therein and a piston rod, the lower end of which carries a hammer, a second cylinder arranged with relation to and connecting through an open passage with the upper end of the first named cylinder, a plunger and mechanism by which it is reciprocated in the second cylinder to compress the air therein, a valve movable so as to retain the connecting passage closed until the air in the second cylinder has been compressed with the desired tension, connection between the valve and the crank shaft through which the compressing piston is actuated so that the valve is reciprocated to alternately close and open the passage. In conjunction with this is a discharge passage from the lower end of the hammer cylinder and a valve adjustable to intersect said passage to any desired degree so that a back pressure may be created in the lower part of the cylinder, and the force of the blow delivered by the hammer and connected parts can thereby be regulated.

PORTABLE CRUSHING MILL.—Henry L. Jessen, Watsonville, Cal. No. 602,221. Dated April 12, 1898. The object of this invention is to provide an apparatus which is portable, and especially designed for crushing barley and other grains, a mechanism for communicating power to operate the same and means for the support and transportation of the combined mechanism. It consists essentially in the combination of crushing rolls with a means for actuating the same, an elevator casing having a discharge spout at one end, the regulating feed supply at the opposite end, a bucket elevator within the casing with means for actuating the same driven from one of the crushing rolls, an adjustable gate operating through the elevator discharge spout between the upper end of the elevator and the crushing rolls, so that the centrifugal impulse imparted by the elevator at its discharge end and the adjacent gate will regulate the supply to the rolls according to the speed of the elevator. The whole is mounted upon a wheeled base or support having a driving motor thereon and may be moved from place to place, it only being necessary to drive it up to the most convenient point for doing the work, and it will then operate to crush any small or large number of sacks of grain as may be required at a minimum of expense.

Some Notes on Sulphur and Sulphur Products.

Written by JNO. W. GRAY.

It has been said that the consumption of sulphuric acid by a nation is a true index of its commercial prosperity. The large increase in the manufacture of this article in America, of late years, and the rapid growth of the industries which are large consumers of and dependent upon the acid for their operations, have been remarkable, and can be truly accepted as one of the certain indications of the constantly increasing commercial prosperity of the United States. The economic results achieved by obtaining sulphur from pyrites, in lieu of the more expensive brimstone, in the preparation of the acid, has greatly stimulated the mining of the former material, and has opened a field of investigation offering tempting rewards to those who may discover the means of utilizing the wastes from the burning of pyrites.

As the important and expensive ingredient in sulphuric acid is sulphur, and as, besides, sulphur has many other applications and uses of commercial importance, it would seem as if the consumption of sulphur by a nation would appear a truer index of its commercial prosperity than that of sulphuric acid, and that the saying quoted above might rightly be changed to so read. As the United States is an enormous consumer of sulphur, the occurrence, distribution, value, etc., of this substance are matters of interest to many, and the publication of a few notes concerning the sulphur industry in general might not be out of place.

The uses of sulphur are varied and extended—for making gunpowder, for bleaching purposes, for insecticides, for taking impressions, etc., and for the manufacture of sulphuric acid, the most important substance consumed in chemcal manufactures. This acid is very largely used in the refining of petroleum and the preparation of the rock-phosphate fertilizers. Other uses are for the manufacture of mixed acids for making explosives, such as nitroglycerine, cellulose, etc., for bleaching paper pulp, for preparation of nitric, nitrous and hydrochloric acids, for manufacturing purposes, for carbonating soda and mineral waters, and for general chemical uses. Few better trades are to be found in this country than those in products which come directly from sulphur.

Sulphur is obtained from deposits of the native mineral and from pyrites. The sulphur of commerce is the native material purified. As found, it occurs in rocks or mixed with certain earthy impurities. The occurrence of the mineral may be described under two conditions: First: The solfatara type, deposited directly from sulphurous gases in regions of expiring or active volcanoes, forming solfataras. The sulphur is found in crevices in the lava or tuffs, or in the sands, ashes and clays resulting from the action of acid fumes on the lavas. Second: The gypsum type, resulting from alteration of gypsum by reducing action of bituminous matter, occurring in a series of sedimentary rocks, with marls, shales and limestones prominently developed. The gypsums, as a rule, have been formed in the evaporation of salt water, and often has bodies of rock salt associated, as in Sicily.

The first condition of occurrence includes the deposits of Celebes, Alaska, California, Nevada and Utah; also, Japan, Mexico, New Zealand, New Hebrides, etc., while the second type includes generally the deposits of France, Greece, Spain, Italy, Russia, and those of Louisiana and Texas.

Although the United States is the largest buyer of sulphur, its home resources have not been much developed. Many countries produce sulphur, but Italy has always been the chief producer. The reason for this has not been the absence of deposits elsewhere, but the fact that competition has been in great measure prevented by the cheapness with which Sicilian sulphur has been mined and put upon the market. In 1896 a syndicate was originated to control the Sicilian sulphur product. Production was fixed at 340,000 long tons annually, while the production in Great Britain, by the Chance–Claus process, was at the same time limited to 40,000 tons. This trust was to maintain the strength of the market, which I believe it has succeeded in doing, owing to the absence of dangerous competition.

The greater part of Sicilian sulphur is still extracted from the gangue in kilns, the necessary heat being supplied by the sulphur. In some cases coal or wood is used as fuel, or the sulphur melted by superheated steam, or a solution of calcium chloride, of which the boiling point is slightly higher than the melting point of sulphur. The proposition to extract the sulphur by means of carbon disulphide does not seem to have become successful. The consumption of sulphur as fuel in kilns is one-third or more of that contained in the rock. Rock containing less than 10 per cent sulphur is not treated. The average of the Sicilian mines is about 20 per cent. The cost of treatment is about 19 cents, and the cost of sulphur of the best quality, delivered f. o. b. on ships in Sicilian ports, is said to be about $16. The regenerative furnace for treating the rock has been largely adopted, and steam extractors are coming into general use.

In Great Britain the Chance–Claus process, already mentioned, is used. This is a chemical process, which produces sulphur from the great mass of waste products of soda works. A large part is recovered as "flowers of sulphur," which finds a ready sale on account of its purity and attractive appearance. In this process 10 to 15 per cent of sulphur is lost in gaseous form and in flour. Nevertheless, large amounts of sulphur are yearly produced, and at prices which make the process a commercial success.

The production of sulphur in countries other than Italy is not great, and rarely amounts to much more than the local demand. In the eastern hemisphere Japan has been a considerable producer, and some of her product finds its way to the west coast of America.

Although there are several deposits of sulphur in California, none are mined in any large way, if at all. Large deposits of the mineral are known at many places in the United States. In Nevada the Rabbit Holes Springs mines have been worked irregularly, but the cost of production, transportation charges, etc., seem to have made the cost so nearly equal to that of imported sulphur as to limit profitable mining. The important deposits of southern Utah are being successfully worked with increasing but as yet limited output. The great deposits of Louisiana, probably the most important known, have not so far produced largely, owing to peculiarity of occurrence and difficulty of mining. None of the promising Texas deposits have been made producers, although efforts to that end are now being made. Sulphur in quantity is reported from Alaska, Washington, Wyoming and Arizona, but none of the deposits are at present being developed. In northern Mexico some promising deposits are now being opened up, but little is known definitely of them.

An enormous quantity of sulphur is used in this country, and the market is a tempting one for local producers; but in a general way it may be said of sulphur deposits that they are apt to be irregular, although rich in places, and that extended pits or drill holes are desirable before definite conclusions can be drawn as to the value of deposit. Deposits well located which can be economically worked, and with cheap transportation, especially if by water, ought to easily command the attention of capital, and it is a matter of some surprise that this branch of mining is not more actively pursued, especially in this part of the world, where such enterprises, under the right conditions, would undoubtedly prove profitable.

Considerable deposits are said to exist in Peru, in the volcanic regions of New Zealand, and in some of the islands of the New Hebrides group. Some of these are large and important, and could be depended upon to supply sulphur in quantity.

Australia imports sulphur from Europe for its chemical industries. In New Zealand there is a growing industry in the conversion of the phosphate of lime found there into superphosphates, and there is also a demand for sulphur for the manufacture of sulphuric acid. In California and in South America, especially in Chili, there is a great demand for the material. All these localities could easily be supplied from some of the places last mentioned, and there seems little doubt that good markets could be found, if the working of the deposits were undertaken.

The consumption of sulphur in the United States, derived from the native mineral, was as follows: From home production, 3800 long tons; imports (mostly from Sicily), 146,420 tons. Average price in New York, about $19. The price on this coast for best quality rules higher, as it also naturally does at all inland points.

The rapidity of growth in this country of all industries upon sulphur as the base of their manufacturing is astonishing. The consumption of pyrites in 1890, in the manufacture of sulphur products, was very large, and two-thirds of the mineral used was imported from abroad. In the Mineral Industry, from which much of the information in these notes was obtained, it is stated that the best practice of the world is now based upon getting sulphur from pyrites, at about half the price of brimstone. In a most interesting manner the possibilities of mining for pyrites are pointed out, and the unlimited demand which exists for the products of such ores is called to the attention of capital. The proposition of mining and utilizing American pyrites for all the minerals they contain offers a means of freedom from the dictates of the Sicilian mine owners, and the inauguration of the new industry mentioned would save the payment of millions each year to foreign producers of brimstone.

An Interesting Showing.

J. A. Edman, Supt. Diadem mine of Plumas county, Cal., has some interesting fossils and ores from the mine he has opened and managed for many years. Mr. Edman became convinced years ago of the sedimentary origin of the Diadem lode, and, after long continued exploration of his lode, discovered convincing evidences of his theory in well defined fossil remains. These are chiefly found in and near the body of dolomite that forms the central core of the lode. which on the 300-foot level averages 60 feet in width between walls. The fossils consist of crinoid stems, fragments in yellow hornstone and fragments of corals, also in hornstone. Most abundant are the low forms of organic life, represented in Loftusia Columbiana, allied to the Foraminefera which occur, forming masses of red hornstone, made up almost entirely of these minute organisms, oolithic or spherical in form, from microscopic sizes up to ¼-inch in diameter. In many specimens the fossil rock has, through metamorphic action, been changed to a coarsely granular rock, carrying gold up to a value of $4 per ton. The fossils mentioned were submitted to Prof. Schuchert of the National Museum at Washington and were determined by him as belonging to the lower Carboniferous period, the Loftusia Columbiana having been found some years ago in British Columbia by the celebrated geologist, Sir Dawson.

Important as this discovery may be from a scientific standpoint, another late discovery by Mr. Edman promises to affect in no small measure the future of our gold-bearing lodes in the metamorphic rocks. It appears that the central core of the Diadem lode consists largely of dolomite generally much decomposed, but becoming harder in depth. In this hard dolomite occur irregular lenses of a blue-black mineral, largely dolomitic, which contains gold in chemical combination, with lead, copper and selenium, and carries values from $20 to $250 per ton. In this selenide of copper is occasionally found, and, as a rarity, crystalline grains of the selenide of gold and silver.

The London Mine Promoter.

A San Francisco man who has had some recent experience in personal dealings with London mine promoters contributes his impressions of their methods, etc., which indicate that, so far as the mine owner is concerned, such experience is usually more interesting than prosperous. He says:

Not one in a hundred of the people who go to London with schemes, seeking a sale of property, especially mines, ever reaches the higher and more respectable class of capitalists. Such are very difficult of access, and unless the parties go well endorsed from first-class men on this side, they can make no headway, or are able to bring their business before the men who are really able to carry through an operation without recourse to the public. Promoters abroad and the uninitiated generally fall into their hands, the first impression being that they are heavy capitalists and fully able to carry through an operation and have no end of money, which error is manifest later.

The process of getting a mine on the London market begins with a contract with the person having the property for sale, whereby he agrees to sell it for so much money, and so much in shares, the money really representing all he is to receive, the shares over and above going to the promoters, and not unfrequently he is forced to take a portion in shares as cash. The next step is to find a broker who will join with the promoters and do the work of issuing the prospectuses. This having been arranged, the next step is to drum up a set of names to act as directors, and here the hard work begins. The success of the scheme depends greatly upon the character and standing of the Board. A well-known banker, an M. P. and a scattering fire of titled names are essential. The latter are the easiest obtained, as they are promised salaries. The others are more difficult, for the English law is very stringent and trustees are held to a degree of responsibility that, in many instances, has resulted seriously to those who have lent their names to schemes that have turned out badly. As the law has a disagreeable construction where there has been misrepresentation, it is liable to be called fraud, which implies imprisonment.

The consequence is that there must be a deal of research, and the scheme must be fortified with the most elaborate reports, maps and documents to satisfy the parties lending their names, and all are scanned and gone over repeatedly; but, as a general thing, the promise of a goodly number of shares as a "quid pro quo" smooths the road, and after the owner of the property has been under fire and before the proposed trustees a dozen times the final assent is given. Then comes the prospectus, and here is where romance runs riot, and Jules Verne would hide his diminished head.

There seems to be no law restricting the promises of incredible dividends, and an ordinary prospectus reads like a tale of the Arabian Nights. Two or three hundred per cent is nothing; and, as the broker sends tons of these circulars all over the Kingdom, the poor, the ignorant and the credulous, dazzled by the promises of such enormous returns on the investment, and seeing the array of respectable names in the Board—the Hon. Wm. Mucklebury of Mucklebury Hall, the Right Honorable Senior Squashhead of Squashtown, the Hon. Lord Noncompoop, etc.—forward their subscriptions—all their little savings—and look forward to a realization of their wildest hopes.

(*To be Continued.*)

IN the issue of the 9th inst., in an article "A Question Answered," giving the per cent of grade required for an economic tram track, the figures .0036% should have read .0026%.

Mining Summary.

CALIFORNIA.

Amador.

(Special Correspondence). — It is reliably stated that work at the Pioneer mine, near Plymouth, is to be resumed in the near future. I am informed that both at the Oneida and South Eureka a find of good ore has been made. There is a probability that a new shaft, vertical, will be sunk at the Kennedy. The present shaft is said to be such that it makes ore production quite an expensive item.

Jackson, April 19th, '98.

At the Ballot mine a new shaft was started which will be sunk 400 feet. A 15-foot vein of good ore was struck last week. S. R. Porter is Supt. At the Central Eureka at 1060 feet a 3-foot vein of good ore was uncovered. The *Record* says that a mill is among the early probabilities on this property.——At the Lincoln mine active work is in progress. Work has begun on the shaft and it is expected to drive this at the rate of 150 feet per month. Senator Voorhels is supervising operations.

W. S. Lyle, Mgr. Fogus mine at Volcano, in crosscutting opened a ledge from 3 to 10 feet wide that assays from $20 a ton upwards.

Griesbach & Mason have tapped the ledge in the old works of their property at a depth of 100 feet. The ledge is 2 feet wide and the ore runs about $20 per ton. —Two men took out eight ounces of gold last week in the Cleveland gravel mine.——The Reward mine at Pine Grove has reached 150 feet depth.——An ore body from 3 to 5 feet wide of fair grade milling ore was discovered in the Decker mine.——At the Wildman-Mahony the main shaft has reached 1300 feet. The new shaft has reached 65 feet.——The old Tellurian mine, abandoned for many years, is being cleaned out by the management of the Tennessee property.——The Amador *Ledger* says that the Pocahontas at Drytown struck a 3-foot ledge at the 400 level.——The Argonaut-Kennedy lawsuit has been transferred to Calaveras Co.——Hite Bros. & Co. have found paying gravel near Coyoteville.

Calaveras.

M. McNear has secured an extension on his bond on the Red Gold mine, at Murphys, and increased the laboring force. A shaft will be sunk and other improvements made.——Riley & Haddock have opened the old Gallagher-Mallroy mine and are taking out some good ore.—— J. C. Seiffert has bonded the Kentucky mine at Mokelumne Hill to the Western M. Co. for $29,100.

El Dorado.

(Special Correspondence).—The Grand Victory mine has come into new ore that is better grade than any heretofore found in the mine. The additional stamps are about in place, and in a few days thirty in all will be in operation.——The pay chute in the Larkin is 12 feet wide. The 5-stamp mill runs night and day. A new vertical shaft is being sunk; cages instead of buckets will be used.——The Gentle Annie mine is making a new record in ore production, which has generally been good grade; but a recent find is richer than any previous discovery.——The Boulder mine, near Shingle, continues operations with increasing success.——The Taylor mine is running on ore from the 1200 level.——The old Columbus mine has been unwatered and the ledge has been found. Active work will continue on this property, which had never been worked to depth of any consequence, and has been abandoned eighteen years. It is a matter of record that from surface diggings, and to the shallow depth of 60 feet, a few Swiss-Italians took out enough money to buy large holdings in Marin county, where they live to-day in luxury and ease.——I am reliably informed that Hanley & Poor, who are working the porphyry seams near Kelsey, sold $2500 worth of gold here last week. This porphyry formation is a feature of that section on Rock creek and the American river. The old Dalmatia mine was a sample of the rich products of that locality. This is another property that was not worked to any great depth.

Placerville, April 17th, '98.

Nugget: Rhodes & Hurley have taken out over $8000 from their porphyry diggings between Kelsey and Garden Valley.——W. Monroe is having an ore crushing made at the custom mill here from Mt. Murphy, near Coloma, which has produced some rich pockets.——The French company operating in El Dorado and Placer counties will make Ralston its headquarters. M. Rigaud will be Gen. Mgr.

Inyo.

Sixteen men are at work in the Molus mine at Bishop. The mill is expected to be in operation shortly.

Kern.

The Johannesburg Reduction Co.'s mill is running on Camperdown ore that is turning out satisfactorily. The Merced mine from forty-one tons of ore cleaned up $1250.——In the King Solomon mine a ledge between 3 and 4 feet of high grade has been discovered.——Glennie & Harris found a 20-inch ledge of good grade ore.——Work has been resumed on the Blackhawk mine. The Yellow Aster M. Co. has purchased the Skillings wells and pipe line and will build a mill of thirty stamps or more.

The Wedge mine at Randsburg on the 250 level discovered another ore chute from 12 to 15 inches wide that averages $240. A mill run of sixty tons will be made May 1st.——E. D. Snyder bonded three claims near Garden station for $6000 and is pushing work.——The Ashford M. Co. has begun work on the Pinmore mine.

Mono.

R. T. Pierce, Supt. Jackson and Lake View M. Co. at Lundy, has left Washington on his return home. He has for some weeks been in consultation with his company, and as a result of the conference an addition to the mill is to be made that will give it three times its present capacity. A new level will also be opened.

Napa.

The old Redington quicksilver property will, it is said, resume work under a London company, to be known as the Quicksilver Mines California, Limited It is said to have been purchased by G. Darsie of Scotland and A. McMillan of California. The capital is $750,000.

Nevada.

(Special Correspondence).—The Brunswick mine, in addition to sinking an additional 150 feet, will install electric power. The output of the mine is said to be such that upwards of $25,000 to be expended on the contemplated improvements can be accomplished, it is expected, without levying any assessments.

Grass Valley, Cal., April 20th, '98.

(Special Correspondence). — The Reward mine, which is turning out high grade ore, made another shipment of this class, while the 2-stamp prospect mill is running steadily on the lesser grade. The mine paid its first dividend last week, and last month's cleanup, which is known to have been very satisfactory, is not included, nor is the last shipment of high-grade ore. It has become a regular thing now to take out ore from the Reward that runs $400 per ton, exclusive of sulphurets of which the ore carries a high percentage of good grade. This property is another illustration of abandoned mines in this county that has improved with deep working. The company controls the water through a 2400-foot drain tunnel, which was cut at an expense, it is currently stated, of $22 per foot.

Nevada City, April 18th, '98.

The German mine, near Washington, which has been idle nearly two years, is to resume work May 1st. There is a 10-stamp mill on the property, and a tunnel about 700 feet. The ore is of an average grade. The milling facilities are to be enlarged after some further development. M. D. Cooley at Washington is Supt.——The Omaha Con. Co. at Grass Valley will outfit their property with electric power.——The new shaft on the Homeward Bound of the Omaha Con. Co., which was begun less than a year ago, has reached a depth of more than 1000 feet. The cost of sinking has been about $12 per foot. There is no timbering required below the 300 level.——Work is progressing on the copper property at Spenceville and ore is being hauled to Wheatland for shipment.

Union: The Brunswick shaft at Grass Valley will be sunk an additional 175 feet, and the work will be pushed as rapidly as possible. The shaft at present is 900 feet.——The Gaston Ridge mine, at Graniteville, will soon place ten additional stamps. The Supt. is D. Harmon.

Placer.

Colfax *Sentinel*: The old Liberty Hill dam, built fifteen years ago and well known in the controversy between miners and farmers and condemned by Judge Sawyer, has stood the test of years, a reminder of the error of his judgment. The dam is situated near Dutch Flat, in Bear river. Last year a permit was given to increase the height of the dam. The new portion has been built from the heavy wash of the Polar Star gravel mine. Great care has been taken to make the dam permanent. The Debris Commissioners have pronounced it satisfactory. The dam has been raised 20 feet. The width of the base is over 300 feet at the bottom and has an average width of over 200 feet. The length is about 80 feet at the bottom and about 360 feet at the top. It has a capacity of about three-fourths of a million cubic yards. A new spillway will soon be cut in the solid rock on the Nevada side, when another raise is contemplated. The raising of the dam has made possible the opening of two mines—the Polar Star at Dutch Flat and the Liberty Hill mine on the Nevada side. The Polar Star is operated by W. Nicholls. About thirty men are employed. At the Liberty Hill mine about twelve men are employed.——Bry & Lazano are sinking on their property near Ophir. They have a 2-foot ledge of sulphuret ore.

The statement of the Pioneer Mining Co. for February and March is as follows:

	March.	*February.*
Tons rock crushed	950	940
Value gold bars	$15,730	$14,100
Pay roll	4,879	3,948
Bills	1,594	1,876
Total expenses	6 473	5,824
Net earnings	9,257	8,336
Average value rock	13 68	15 06
Men employed	55	50

Plumas.

The *Independent* says there is an almost entire absence of snow on the higher ridges of the county and the water in the streams has not been so low since 1864. Quite a number of claims which heretofore yielded each season enough gold to supply the necessities of the families of their owners for the entire year will not give a color this year for want of water.

San Benito.

The annual report of the New Idria Quicksilver M. Co. for year ending Dec., 1897, shows net proceeds from sales $125,197, increase in cash supplies $3730; total receipts $128,928; total expenses $81,342; net earnings $47,586; dividends $30,000; total surplus $28,248. There were produced during the year 15,310 tons of ore and 3605 flasks. The new reduction works were in full operation only seven months. The development and prospecting work has been continued with good results.

San Diego.

The recent ore discoveries on the edge of the desert are developing good results.——The Kentuck S. and Cheerful Moments mines in the Banner district are sold to New York capitalists, to be known as the California G. M. & M. Co. The price given out is $1,000,000. Development work has begun. A 1200-foot tunnel will be run, from which a 400-foot shaft will be sunk. Power drills are in use. The mine is an old property, but no work has been done on it for twenty years.——The Ranchita, Ready Relief, Antelope, City of Richmond and Elevada mines are all in operation.——Work is to be resumed on the North Star, Helvetia and Cincinnati Belle.

Shasta.

At Whiskytown a ledge was discovered in the Colorado mine at 60 feet depth that mills $100 per ton. A 300-foot tunnel in the same property at a depth of 300 feet taps a 2-foot ledge that runs from $8 to $60 per ton, exclusive of sulphurets.——Development will begin shortly on the Burns & Woodward property.——D. Pesenti sold five claims to the Mountain Copper Co. for $625.——D. Thompson is opening a quartz property near Keswick.——The ledge of the Tacoma Con. M. Co., near French Gulch, is 4 feet wide and runs $50 per ton.——A half interest in the Black Hawk and Cape Horn claims was sold for $2000.——Davis & Co. are at work on a 15-foot ledge of copper ore near Whiskytown.——The reverberatory furnace at the Keswick smelter is running night and day, and disposes of ninety tons of the fine ore every twenty-four hours.

The Diestelhorst Bros.' dredger continues operations on the Sacramento river with fair success.——The Union Mines Co. No. 2 are sinking shafts to bedrock on the old Sacramento river channel near Middle Creek. Heretofore bedrock could not be reached in this claim because of too much water. Operations are being conducted by a steam power hoisting and pumping plant.

Siskiyou.

J. W. Armstrong has taken a bond on the Jennie Lind mine for $1500.——Gilso & Co. during March, with a 5-stamp mill, produced $4000 on the California Queen mine.——H. J. Barton is putting in a wing dam at Oak Bar, and A. Garrett is wingdamming at Hamburg Bar.——Fifteen tons of ore from the Mountain King mine milled $60 per ton. The Miner's Dream mine is developing a ledge of fair size and quality. On the Commodore mine a 20-inch ledge has been found.——The Vesey Bar Co. at Honolulu began hoisting gravel last week.

The Yreka *Journal* says that arrangements are in progress to place an extensive dredging plant in Yreka creek near Yreka.——The McNulty ranch has been bonded for $42,000; also, the Foster, Perry and Miller places. Negotiations are on foot to secure the Blake place and Burgess fields. Work is to begin shortly at the Perry place.——J. P. Bradley contemplates the erection of a 20-stamp mill, to be operated either by electricity or steam. He has a 6-foot ledge of fair-grade ore.——The Diestelhorst dredge on the Klamath river is working constantly and taking out good gravel.——Le May & Co. find good prospects in the Cape ledge on Greenhorn.——The gravel beds of the Siskiyou M. Co., near Happy Camp, is owned by New York people, and comprises 2000 acres. The water is conveyed to the claim through a fourteen-mile ditch and flume. Four giants are used and twenty men employed during the water season. During the last three months' run the three cleanups amounted to $19,000. It is thought the company will have enough water to run until July. Nearly all the small placer mines on the Klamath and Salmon rivers are idle for lack of water.

Trinity.

Bainbridge Bros. are developing a 3½-foot ledge near Hall City which yields good assay values.——Work on Poker bar, an area of auriferous gravel on the Trinity river, has never produced the success that encourages continuous operations because of the difficulty of getting water enough. Montana men now in possession of the property propose to dam the Trinity and flood the auriferous deposits. A dredger will be floated over the bar and put in operation.——The Brown Bear mine at Deadwood made a shipment recently of seven tons of ore to San Francisco that netted $7600.

The Trinity Center Hydraulic Co. is running night and day.——The Strode Bros., near Carrville, have resumed work in their mine and mill.——H. Wagner is pushing development work on his properties on Coffee creek. From 6 to 10 per cent is concentrates, which run from $300 to $500 per ton.——At the Integral mine the tunnel has reached 1600 feet.——Volmers & Stoddard have resumed work on their quartz property near Cinnabar.

The flooding of the Altoona quicksilver mine last year was caused by tapping a subterraneous reservoir. The water is supposed to have gathered from Soda Springs, above the lower workings. The water was brought under control by the installation of pumps of large capacity, which even now are in operation day and night. Work proceeds in the mine without interruption. The output of quicksilver for 1898 it is calculated will reach 500 flasks per month.

Tuolumne.

The Carlotta mine, which has been closed for three months, has resumed work. The shaft has reached 218 feet, but sinking will not be continued until the latter part of May. Drifting has began on the 200 level. The ledge is 12 inches wide and mills $25 per ton in free gold. The sulphurets gain 5 per cent and average $150 per ton. The Carlotta has a steam hoist capable of 800 feet. A 10-stamp mill is contemplated for the property in the near future. D. Neagle is Supt. and employs twenty-five men.——The Pennsylvania is operated by the same company. The shaft is 200 feet. A drift has been run 100 feet each way on a ledge 18 inches wide that mills $25 per ton, with 10 per cent sulphurets, that run from $200 to $400 per ton. A carload of ore shipped to Selby's yielded $121 per ton.——The shaft at the Grizzly mine has reached 350 feet.——At the Dead Horse sinking is being pushed to the 1550-foot level.——The shaft on the Providence mine has reached nearly 300 feet.

Yuba.

The Marysville *Democrat* reports the finding of a vein in the Pennsylvania mine at Browns Valley that is 11 feet wide and averages $10 per ton, exclusive of sulphurets. Sixty men are employed. The new vein is on the 800 level.

NEVADA.

The Edison mine, near Dayton, milled ten tons of ore that returned $30 per ton.——The cyanide plant at Pine Grove has begun work on about 20,000 tons of tailings which will average $8 per ton. The 10-stamp mill is crushing twenty tons of ore daily that yields

On May 20th the Johnson-Locke Mercantile Company will dispatch from San Francisco the Steamer "Tillamook" for Dutch Harbor, Nunivak Island and St. Michaels.

This will be the First Steamer Sailing this Season for the North. The Attention of Owners of River Boats Outfitting at Dutch Harbor or Nunivak Island is Called to this Early Departure. As the Space on the "Tillamook" is One-Half Engaged, Early Application for the Remainder is Necessary.

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from $20 to $60 per ton.——The Winnemucca *Silver State* says that 33,000 pounds of borax were shipped from there to San Francisco, and that the production of Humboldt and Churchill counties this season will be larger than at any previous time, owing to the 2½-cent tariff.

Returns of 750 ounces silver and 4½ ounces gold were the results of twenty-two sacks of ore from the Resurrection mine in Elko county.

OREGON.

J. L. Wright is developing a quartz property near Grants Pass with satisfactory results.——The Lawrence M. Co. are doing extensive development on a property near Leland. A 50-ton capacity mill will be in operation May 15th. Twenty men are employed.——At Granite City the La Bellevue mine has started its new mill on ore of fair grade.——J. Toy has discovered a ledge near Baker City from which mill tests yielded $200 per ton.——The Don Juan is pursuing development with satisfactory results. —— The Golden Eagle struck an ore body of good grade.——The first cleanup of the Oregon G. E. Co. at Ashland was made last week. One of the bricks of amalgam weighed eight pounds. This is a cyanide plant and is pronounced a success on the low-grade ores of that section.

Carpenter & O'Brien have bought the Claiborne mine, near Baker City, for $3000.

The Badger M. Co. shipped a carload of ore from Long Creek to San Francisco.——The Shorty Hope mine at Jacksonville is crushing twenty-four tons of ore per day in a 10-stamp mill.——Van Dorn & Gifiin are developing a quartz property from which mill tests produce satisfactory results.——A 5-foot ledge has been discovered in the Miller mine, near Canyon City, that yields good returns.

WASHINGTON.

A new ore chute was found in the Butte & Boston at Republic that assays $23.46 per ton. The Republic mine is said to have enough ore in sight for two years' work for a smelter of 100 tons capacity daily.——In the Republic No. 2 a ledge was opened that is 14½ feet wide.——At Bossburg a 4-foot ledge bearing gold, copper and silver was discovered in the property owned by the Sulphide M. Co. Assays returned $58.28, of which $17.34 was in gold.——At the Rebate a ledge 6 feet wide has been found that yields from $20 to $26.50 per ton.——At the Blacktail mine an ore body is producing $80 per ton.

Returns for a third lot of ore from the Republic mine are eight ounces gold, seven ounces silver per ton.——On the Lillie mine, after running a crosscut tunnel of 160 feet, a 6-foot ledge was cut that assays from $6 to $48.——The Mineral M. & M. Co. will begin development shortly of their property near Northport.

BRITISH COLUMBIA.

The C. P. Ry. Co. will build a lead smelter of 150 tons daily capacity at Trail.——The Idaho mine in the Slocan is taking out forty tons of ore daily.——Wallaston & Johnson have sold the Hoodoo group, comprising ten claims, near Grand Forks, for $20,000.——The R. F. Burns mine, near Golden, was bonded to an English company for $22,500.——Capitalists interested in the War Eagle have bought the Ben Tillman group for $50,000.——Three feet of ore assaying $21 gold was discovered in the Flossie R. mine in the Salmon river country.——It is said that the ledge in the Three Graces group in East Kootenay is 260 feet wide. It is a free milling proposition, yielding an average assay of $4.90.——The total ore shipments for 1898 from Nelson are 31,654 tons, of an approximate value of $3,010,259.

IDAHO.

F. W. Thornton discovered a 4-foot ledge at Florence.——The Electric M. & M. Co. opened a ledge of good pay ore.——In the Toledo mine an ore body of good value was struck that averages 4 feet in width.——The Golden Star, near Hailey, has a 13-foot vein that assays $47 and the sulphurets average $200 per ton.——Development has begun on Golden Fleece and Golden Star properties, near Idaho City.——Emery & Hall have developed a 40-foot ledge at a depth of 100 feet which is said to be good-milling ore.——Barker & Cartwright and J. Irwin have begun hydraulicking on their claims.

Near Silver City J. C. Bernard is operating extensively in the placer mines of Snake river. His flume and ditch 1300 feet long are fed with water raised from the river by a 35 H. P. engine and 10-inch centrifugal pump, having a flow of 150 inches. The grizzly boxes are 300 feet long, and at their terminus are fourteen blanked covered tables. The concentrates are hauled by rocker covered with plates and then cyanided. About 200 cubic yards of gravel are handled daily.——At the Poorman mine, near Florence, extensive development continues and several hundred tons of ore are on the dumps.

UTAH.

S. Newhouse and associates made the final payment of $107,504 for fifty mining claims at Bingham.——A new discovery of high-grade ore has been made in the Copper King mine, near Logan.——The Sacramento marketed cyanides to the amount of $83,000.——The Niagara M. Co. of Bingham shipped ten cars of ore that showed 35 per cent lead, 10 ounces silver and $2 gold.——A new strike is reported in the Homestake at Silver City. The ore shows antimonial copper and gold. The ledge is 18 inches wide.——Ore has been found at 335 feet depth in the Rabbit Foot mine at Tintic.——The Geyser-Marion at Tintic is crushing 150 tons of ore daily.——The Washington mine at Frisco made its first shipment. ——The Dexter is increasing the capacity of the cyanide plant to a total of 197 tons a day.

The Salt Lake *Tribune* says that the entire battery, sixty stamps, at the Mammoth mill is hung up and the plant closed down. Following this was the suspension of all work at the mine, and the rolling stock on the new East Tintic railway, whose iron connects the mill and mine, is sidetracked and motionless. At the mill the entire force of fifty has been laid off. At the mine over 130 men are idle and all the men employed on the railroad. An officer of the company said it had been brought about by the inability of the company to secure timbers at the mine. When the new management stepped in, among other things done was to enter into a new contract for timbers, that have not yet been furnished. Without timbers the management did not deem it safe to continue, and so the further extraction of ore was abandoned and the men withdrawn. This, of course, necessitated the shutting down of the mill. Another officer of the company said that while a lack of timbers was the immediate cause for the shutting down of the mill, there was another. The latter, he declared, was covered by a vain attempt to run the mill on material of a gross value of $7 a ton, when ore to the value of $9 a ton was necessary to pay the actual cost of operation. The average value of the ore put through the mill in 1897 was $14 per ton, and as long as that average was maintained the plant was made to yield a profit each month. Of the ore bodies in the property, the same director says they are in fine condition, but, in the absence of timbers, the stoping of them cannot be continued.

Six cars of ore were shipped from the Horn Silver.——Another strike is reported from the Bullion-Beck on the 900 level, showing 30 per cent, 20 ounces silver and $3 gold. Of this it is said there are 24 inches. The Bullion-Beck is producing over 2000 tons of ore a month.——The Columbia reports ore that shows over 200 ounces silver and a small amount of gold.

Nearly 10,000 tons of ore have been marketed by the mines of Park City the past ninety days. Of this amount the Silver King has furnished 75 per cent. The output of this property will reach 2500 tons a month.——The Anchor, with its concentrates and crude ore, is averaging 500 tons a month.——T. G. Merrill begins development on the Gracie group at Silver City, and will also continue prospecting on the Daisy and Omaha on West Dip, and also on the Vanderbilt group.——Ore shipments from Park City for the past week amounted to 1,456,760 pounds.——From Silver City twelve cars of ore and one car of talc were shipped.——One carload was shipped from the Washington mine at Frisco.

MONTANA.

The Ruby mine at Basin last week shipped five carloads of ore which netted over $1000 a car.——The Boston & Montana Con. C. & S. M. Co. has incorporated under the laws of New York, with a capital of $3,750,000. The Boston *Post* says that the action of the Boston & Montana people is the decisive step toward the consolidation of the Boston & Montana and the Butte & Boston mining companies. No such consolidation could be brought about under the existing Montana laws. The original Butte & Boston M. Co. embraced about as many properties as it was permissible under the laws of Montana for any one corporation to control and operate, and it was with an eye to a possible future consolidation with the Boston & Montana that the reorganized Butte & Boston was incorporated under the broad statutes of the State of New York.——The Queen of the Hills mine at Neihart is making weekly carload shipments. ——Work is to be resumed shortly on the Bimetallic properties.——The Cooper mine, near Townsend, has discovered an ore shoot of good values and shipments to the smelter have begun.

The *Inter-Mountain* says that one of the most encouraging signs of the times in that district is that more development is in progress at the mines than at any previous time in the history of Butte. New copper properties are being opened and several of the old producers are being developed to greater depth.

The Green Mountain shaft is rapidly reaching the 1800-foot mark. It is reliably reported that at the 1700 level a vein of high grade copper ore was cut. The shaft will be sunk to the 1800 and then crosscuts will be run.

The Parrot Co. started work on the Bellona and a deep shaft will be developed.——At the Little Minah, another of the Parrot properties, the shaft has reached 600 feet.——The Speculator shaft has reached 850 feet, of which 150 feet is recent work.——The Modoc shaft of the Anaconda Co. is being put in order again after a long shut down.——At the Boston & Montana properties much development work is in progress. The West Colusa, with its ore reserves from the Comanche, is in better shape for the production of ore than at any time.

The Columbia mine at Pipestone is developed to a depth of 300 feet, and has 1600 feet of drifts. The ore is oxidized iron pyrites and carries a fair percentage of gold. The 10-stamp mill is to be enlarged to twenty stamps. The property is owned by Senator Hoffman of Bozeman.

The Queen mine, near Neihart, shipped two carloads of ore. On the 300 level they have cut 2 feet of ore said to be high grade. The Diamond Hill mine, near Townsend, will resume work soon.

WYOMING.

F. M. Bacon of Plainfield, New Jersey, will build a 25-stamp mill at Grand Encampment, on which construction will begin soon. This will be the first custom mill that the Grand Encampment district will have. Douglas & Adams' mill devotes its entire capacity to ores from the Northern Belle mine. The new mill will confine itself to the handling of ore from the Golden Eagle and Whippoorwill mines.——Two shifts are working on the property owned by the Philadelphia G. M. & R. Co.——An 18-inch vein of fluorine-stained quartz has been opened on the Isadore lode. The highest assay obtained was $164 in gold and a general average taken returned $42.40. J. H. Graham and W. E. Palmer own the property. Ore is being sacked for the initial shipment.——Farrel & Bush have located a group of copper prospects near Grand Encampment and two shafts are being put down on leads of copper carbonates.——Work will be resumed May 1st on the Portland copper and gold property, owned by J. Ledbetter. Thirty men will be employed.——The Grand Encampment Co., a Cleveland, Ohio, corporation, is advertising for bids for the development of its Blue Belle property and the deepening of its shaft, in which copper and cobalt have been discovered.

M. Maloney has discovered an ore body of fair size near Laramie that yields copper and gold assay values.——Jones & Andrews will begin development on a group of claims near Atlantic City.——In the Caribou mine, near the same place, a 2½-foot ledge yields $30 per ton.——In the Big Mag mine a vein has been opened between 2 and 5 feet wide.——The Flynn Co. will resume work without delay. Their ledge is 5 feet wide and assays $8 per ton.

SOUTH DAKOTA.

The St. Elmo mine, near Hill City, started its new mill and is treating thirty-five tons of ore per day.——The Lizzie, near Deadwood, is pushing development. The vein is 10 feet wide, with a 2-foot copper bearing streak.

MINNESOTA.

The Ferguson mine, near Rainy Lake, has resumed operations.——The Olive G. M. Co. have installed a compressor plant. After some further development work a 1-stamp mill will be erected. W. A. Preston is Supt.

WISCONSIN.

The Oliver M. Co. expects to take 800,000 tons of ore from the Norrie group of iron mines.

ONTARIO.

(Special Correspondence).—The Golden Star M. Co. (Limited) of Ontario have reached a depth of 227 feet in their shaft No. 1. The Golden Star quartz carries a large percentage of metallic iron. The company will put in a 40-stamp mill next fall. They expect to have reached a depth of 400 feet by that time. Fifty men are employed.

At the Foley mine they have reached 450 feet in the north shaft. Solid quartz covers the full width of the shaft at this depth.

Duluth, April 13th, '98.

The Stella mine, near Rat Portage, has three shafts, each on a vein from 4½ to 5 feet wide.——The Mascotte mine at a depth of 200 feet has discovered an ore body of good value.

Seine River, April 15th, '98.

COLORADO.

The Shurtloff mine, near Cripple Creek, is under bond to the Prudential G. M. Co. of Chicago for $75,000. The property has a 7-foot vein. Assays run as high as $85 per ton. ——Stark & Whiteside have a 5-foot vein that runs from $20 to $345 per ton. The output last month was 120 tons.——The Elkton people ask for estimates for a mill to treat low-grade ores.——Hanlon & Wigand have taken a lease on the Summit claim for eighteen months for $80,000.——Ouray shipped 214 cars of ore during March—an increase of 44 cars over February.——The Virginius at Eldora is making weekly shipments of a good grade of ore.——In the Appanalis a 2-foot vein was discovered that averages $40 per ton.——At Leadville the Oro City claim has reached 425 feet depth; the last 70 feet are in quartzite stained with zinc.

At Central City the Pittsburg mine has reached a depth of 300 feet and is making regular shipments.——At Eldora a rich find was made in the Spencer Mountain mine. The mine has a 3-foot vein of tellurium ore.—— The Baldwin mine, near Central City, made a shipment of $50 ore.——In the Cardigan mine at Idaho Springs the pay streak has been opened for 700 feet. Of this some is smelting ore of high grade and the balance is milling ore that will run $8 per ton. A payment of $25,000 was made on the purchase price of the mine.——The Mascott at Georgetown made a shipment which ran 22 ounces silver, 1.44 ounces gold and 7 per cent copper. ——The Democrat Mountain made a shipment that returned 41 per cent lead, 14 ounces silver, 1-10 of an ounce gold.——The Centennial mine, on the 600 level, has 450 feet drift all on ore giving 9 ounces gold, 65 ounces silver and 7 per cent copper.——At a meeting of the directors of the Elkton Con. at Cripple Creek, Bernard was authorized to ascertain at what figure the company could build or buy a suitable mill to treat the company's ores.——The Denver *Post* announces the sale of the Black Diamond group at Silverton to the Iowa G. M. & M. Co. for $100,000. This property has a vein varying from 6 to 11 feet in width carrying a body of lead ore.

The Zeolite is outputting one car a day of ore that runs $25 a ton.——The Gold Hill tunnel has reached 3100 feet at the Anchoria-Leland and the shaft 650 feet. The tunnel will be pushed through the Anchoria-Leland properties.——The Morning Star has a 3-foot vein that runs $28.——The Victor is sending out 100 tons of ore a day. The high-grade is divided into two classes; one averaging $250 and the other $80 per ton. This property has paid nearly $1,000,000 in dividends.——The Anaconda is outputting thirty tons a day.—— The Half Moon's production last month was over 1000 tons of an average grade of $45 per ton.——The Orphan Belle has completed considerable deadwork and added machinery and surface improvements. Ore will be taken from the 300-foot level which is in new ground. The property comprises thirty-four acres and was purchased for $300,000.——The Strong mine, at Cripple Creek, has shipped within the last few months an aggregate of 300 tons per day and arrangements are perfected to increase this product. The Denver *Mining World* says it is stated on good authority that 90 per cent of this ore is high-grade smelting ore. The Florence & Cripple Creek railway has been taxed to its utmost capacity to furnish cars for transportation of the ore.——The Goldsmith, at Ohio City, is shipping ore that runs from $100 to $200 per ton.——The Portland produced last year 18,852 tons of ore of a gross value of $62.47 per ton which netted the company $993,639.——A shipment of eleven tons of ore from the Moore netted five ounces per ton.——Gaffney Bros., at Cripple Creek, made a twenty-ton shipment of $50 ore.——The output of the Pauper last week was forty tons of $50 ore.——Crawford Bros. shipped twelve tons that netted $70 per ton.——Ore from eight different shafts on the Specimen last month amounted to 200 tons.——The *Telegraph* says that the Potvin and Vane lease, on the Christmas, has a weekly production of 100 tons of ore that averages better than $40, and some fifteen carloads have been settled for at better than $60 a ton. Production from the lease has been steady since early in February. Potvin and Vane had to prospect for seven months before they found the ore, but are making up for lost time, and with another level opened will easily double their present production. The ore is in no place less than 5 feet wide and occasionally 10 feet is broken in order to get both walls.

The Sedalia at Leadville is producing fifty tons of ore per day.——At the Bachelor mine, near Ouray, sixty-five men are employed. A vein of high-grade ore was recently discovered and the mill will be ready to make shipments so soon as the roads improve.——C. H. Nix is taking out a good grade of ore and employs twenty-five men. The average product is about forty tons per day.——At the American Nettie a car of first-class ore per day is the output. The mine gives employment to sixty men.——The Wedge has reached 450 feet depth in a body of fair-grade mineral.—— At Cripple Creek the Vaugh & Christian lease shipped 100 tons the past week.

On the Independence, near Silverton, work is progressing and upwards of a half ton of $50 ore is broken daily.——Tandy & Co., near Spanish Creek, are working 6 inches of high-grade ore.——The San Juan M. & M. Co., at Silverton, will begin work on their property May 1st.——In the Tom Moore, near Eureka, was discovered an ore body at 200 feet depth returning gold, silver and copper aggregating $100 per ton.——In the Alda, near Silverton, a vein was discovered that runs $18 gold and forty ounces silver.

ARIZONA.

The importations of copper during March through the Nogales custom house amounted to 7,665,784 pounds, valued at $554,084.——The King of Arizona mine, near Yuma, has reached a depth of 600 feet. The twenty stamps are in constant operation.——J. W. Gerritt has purchased the old Metallic Accident mine, near Kingman, and will soon resume work on the property.——Clack & Poland shipped twenty tons of ore from the Oro Plata mine.——O. F. Kuencer has resumed work on the Esmeralda mine.——S. G. Thompson is developing a property near Klondike that carries from one to two ounces gold per ton.——The Sterling Placer M. Co. has begun work on a large scale on the Hassayampa river.——At the Azurite mine they have a lead on the 200 level that is 15 feet wide.——The Mojave County *Miner* says that the 500 H. P. engine for the Temple Bar Con. M. Co. has arrived, and two steel cables 1200 feet in length were sent to the river to be used in connection with the ferry boat. Another large cable will be used in conveying wood across the river to the big pumping plant. The pumping plant, when completed, will deliver 1800 miners' inches of water at a height of 200 feet, a volume sufficient to handle 6000 cubic yards of gravel daily.

The King of Arizona mine will put in a cyanide plant.——The new Vulture Co. contemplate putting up a 40-stamp mill.

The Guijas G. M. Co. at Oro Blanco are pushing development with satisfactory results. At a depth of 100 feet an ore body of pyrites was discovered that carries a fair percentage of gold. Two hundred tons of ore are on the dump.——At the Golden Star a tunnel has been driven 250 feet along the ledge. A sample of five tons gave an average value of $35 per ton.——Development on the Velvet group continues with satisfactory results.—— Development has begun on the Black Diamond mines—a copper property—near Tombstone. These are under bond to N. O. Bagge of New York.

NEW MEXICO.

The Cochiti M. Co. at Bland has bonded six claims and agreed to expend $30,000 in development work.——The Lake Valley mines shipped 4000 tons of ore this year.——Sixty tons of concentrates are delivered daily at the Pacific mill in Silver City.——The Simpson smelter is turning out nine tons of copper bullion every day.——The Alhambra has been unwatered and is being retimbered. This is a silver property.——The Standard, after a suspension of work for two years, has resumed operations.——The Black Horse mine, in the Moreno district, has 2000 feet of development work. The ore yields from $10 upwards.—— The Grand View has 600 feet of development work.——The Indiana, on which development is being pushed, shows a pay streak of about 20 inches which assays from $30 up per ton. ——The Galena and American Flag properties, near Elizabethtown, show a fair grade of ore. The Moreno, of the same group, is shipping the high-grade ore and milling the low-grade.——The Hidden Treasure has begun a shaft that will be sunk 500 feet.—— Work on the Lexington is being pushed with satisfactory results.

Active development work is in progress on the Jumbo group, near Elizabethtown.——The Frazer copper property at 300 feet depth has a 4-foot vein that averages $45 in gold, silver and copper.——The Confidence mine is taking out eighty tons of ore per day and milling it at Whitewater.——The mines at Hillsboro since the beginning of the year have taken out 2660 tons of ore.——Work will be resumed shortly on the Golden Era group.

AUSTRALIA.

The Bendigo gold mine has reached a vertical depth of 3350 feet and is still going down. Some almost barren zones have been penetrated, but good ore was found beneath each barren zone.

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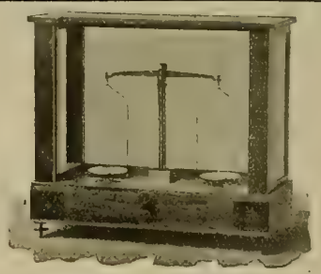
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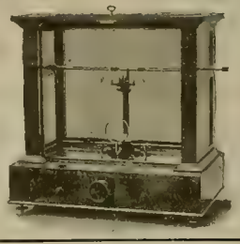


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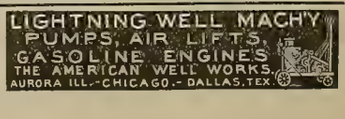


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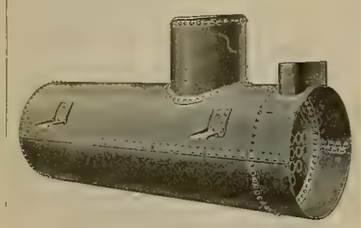
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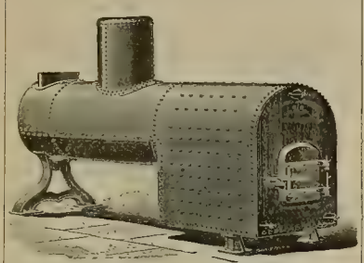
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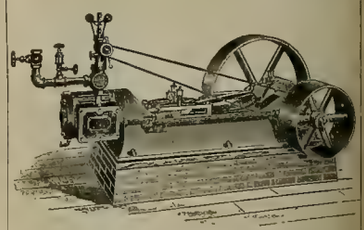
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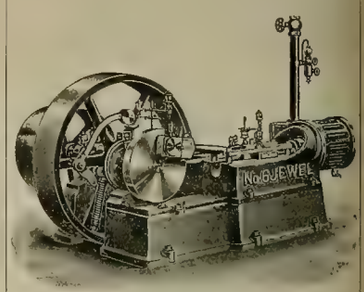
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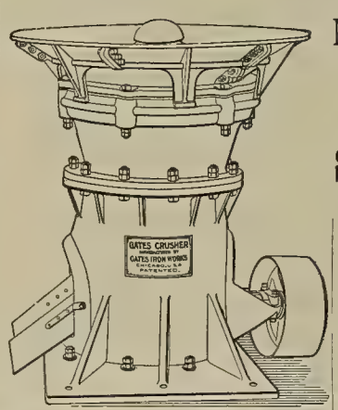
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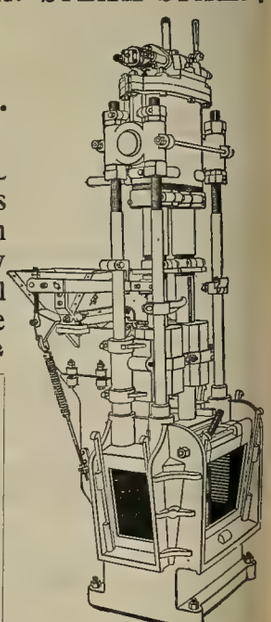


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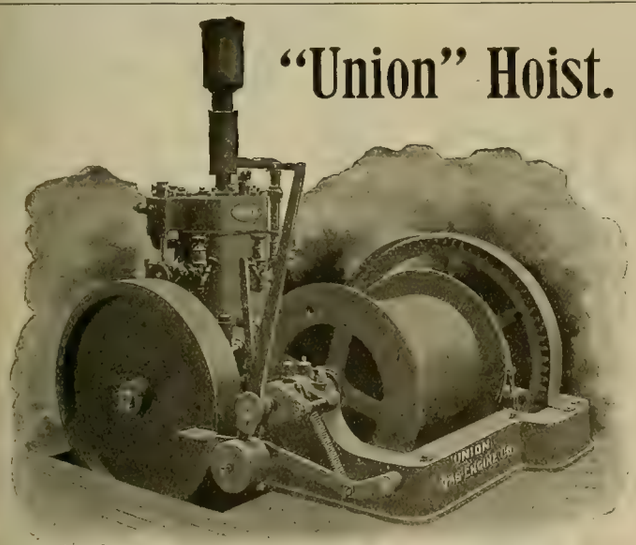
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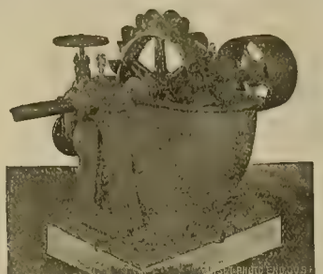
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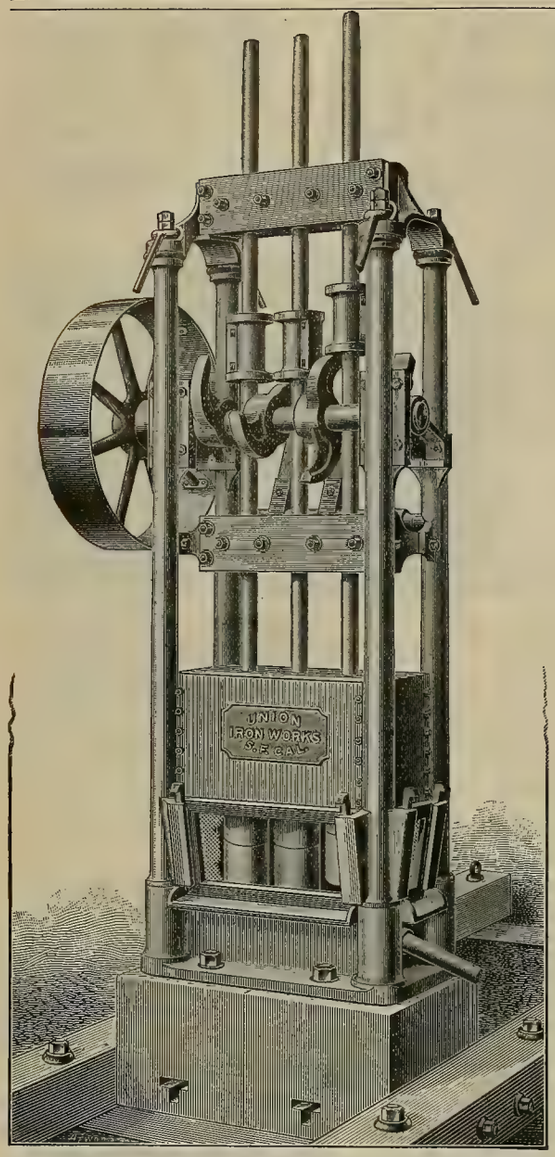
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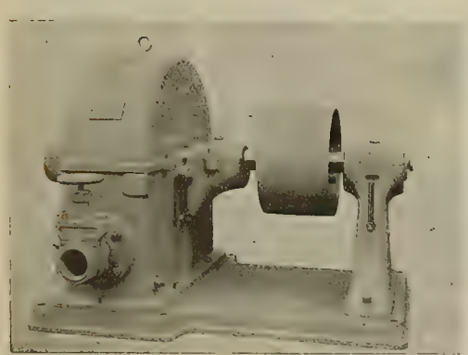
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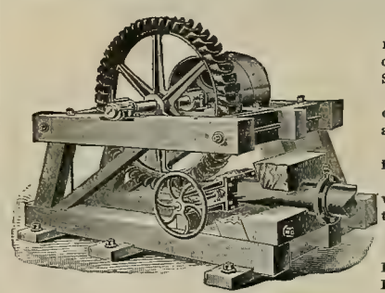
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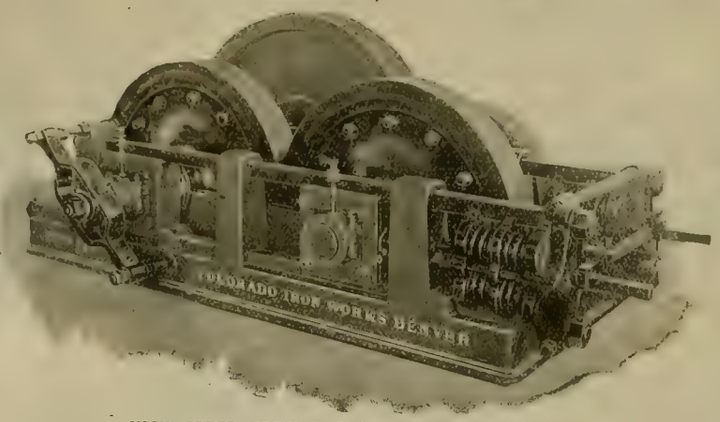
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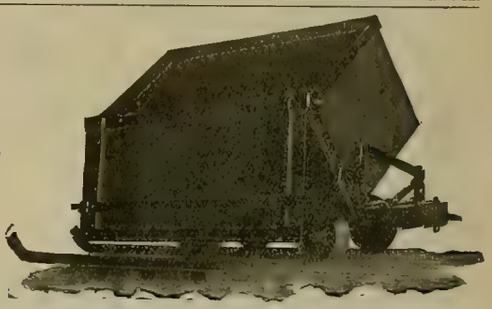
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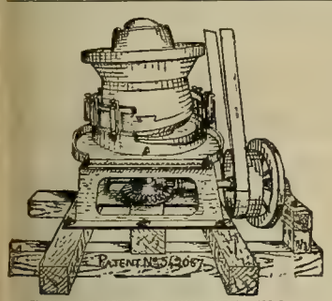
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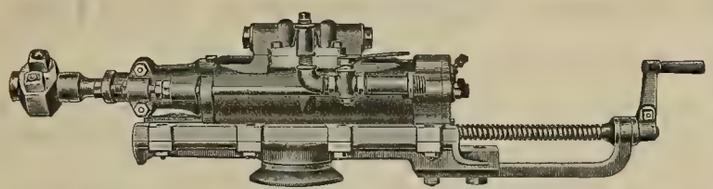
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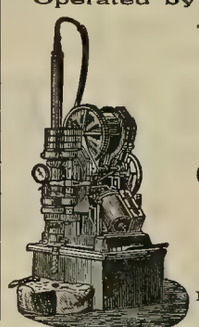
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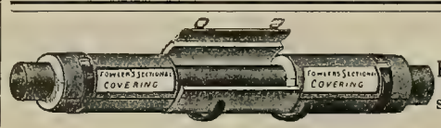
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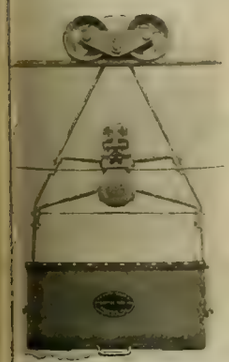
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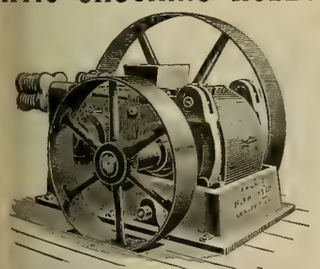
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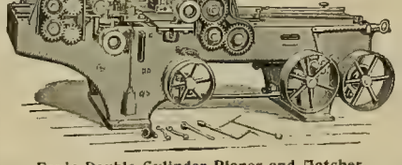


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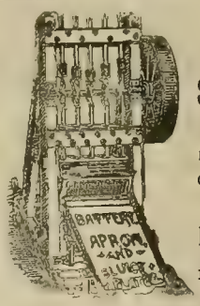


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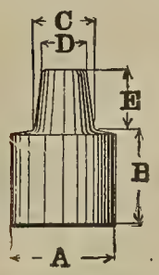
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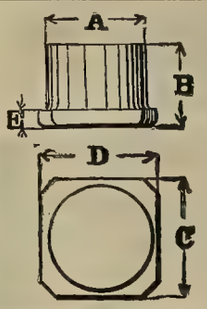
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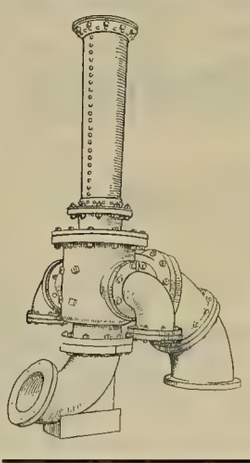
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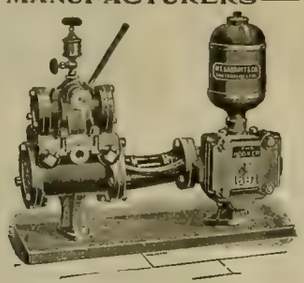
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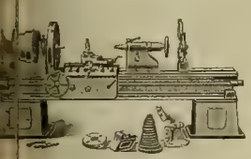






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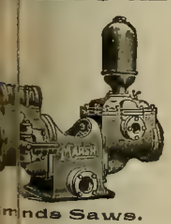


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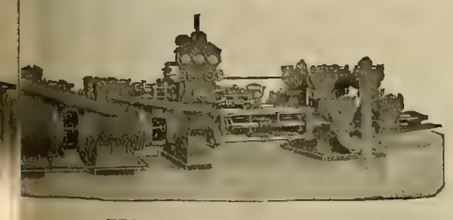


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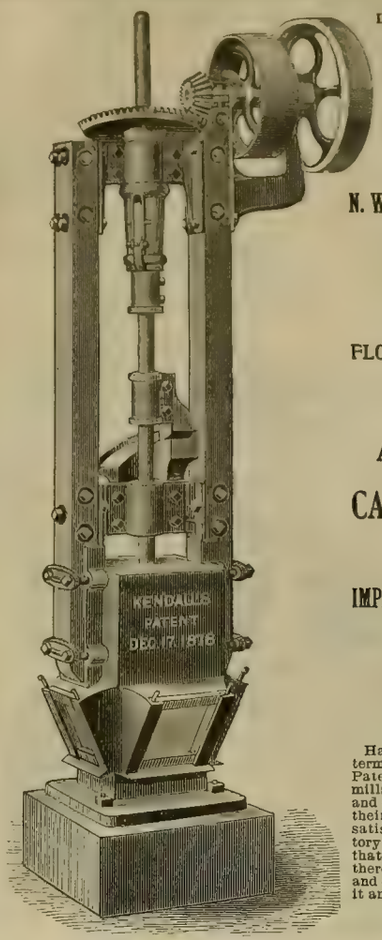
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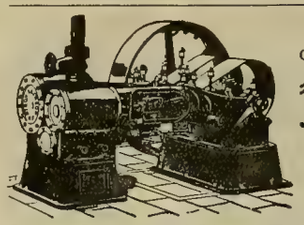
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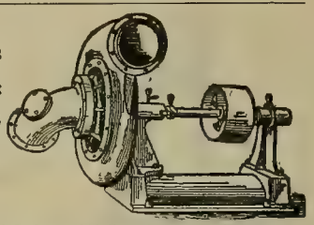
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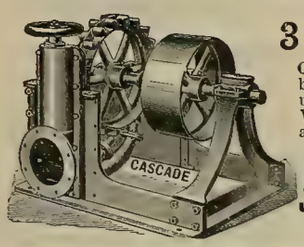
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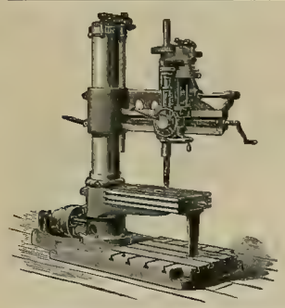




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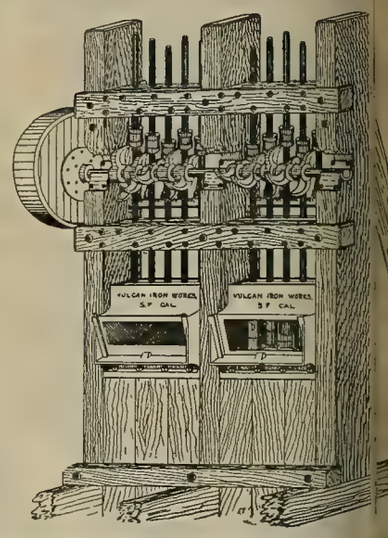
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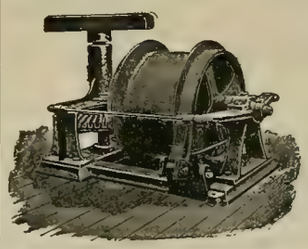
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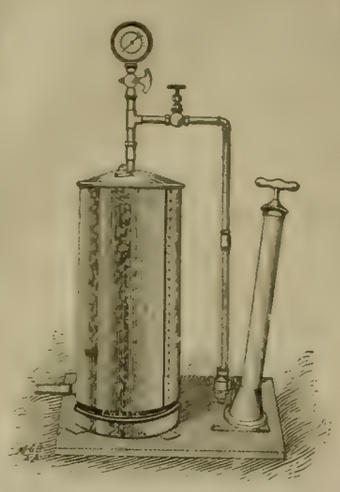
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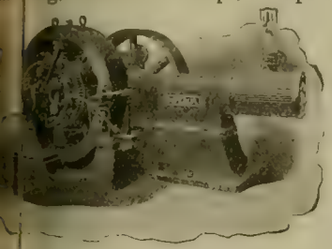
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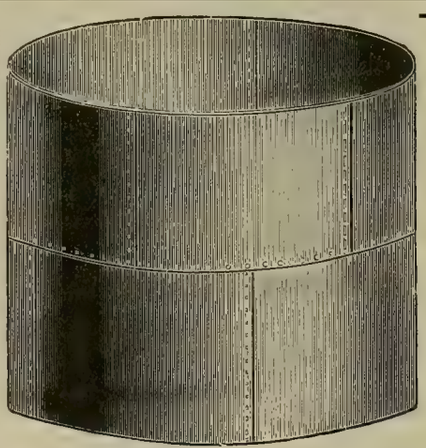
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Market Reports.

The Markets.

SAN FRANCISCO, April 21, 1898.

The solidest stocks and bonds, national and local, have suffered depreciation this week. The departure of troops, the extreme likelihood of war and the popular flutter are evidently being worked for all they are worth by those whose motto is, "buy when they are cheap and sell when they are dear." Government 4's and gas and street railway stocks are alike affected. It is probable the closing week of a momentous month will see a further drop, and then the swing of the pendulum will send prices the other way.

Local wholesale prices are stiffer. Everything in the way of provisions is higher because of the drouth. There is little change to note in staple miners' supplies outside of provisions.

London and New York report silver 26d and 56c, respectively.

The bureau of statistics of the Treasury Department reports imports and exports of the United States of gold, silver, etc., for the month and nine months ended March 31st, respectively: Exports of gold coin and bullion, $658,834—$13,516,619; imports, $30,200,265—$66,510,962; excess of imports, $29,541,431—$52,994,343; exports of silver coin and bullion, $3,995,818—$42,468,739; imports, $445,352—$9,098,456; excess of exports, $3,550,466—$33,370,283.

By the time this is in print it is almost certain that actual hostilities will have begun between this country and Spain. That nation will be wiped from the Western map and the United States enters on a policy which opens a new era.

Mining Share Market.

SAN FRANCISCO, April 21, 1898.

Mining stocks during the week shared in the general depression occasioned by exciting war news. There is practically no business. The official letters from the Comstock justify higher prices, but it is not the first time that the condition of the mines themselves had very little to do with the prices at which the stocks sold. In the New York *Financial News* N. Wertheimer, Vice-Pres. Standard Con. Mining Co., suggests: "In view that in case of hostile demonstration being undertaken between the United States and Spain, many of our low-priced railroad securities may for a period remain inactive, would it not be wise for investors to turn their attention to many of our well known and honestly managed gold and silver mines which are listed on our several stock exchanges, and that are being properly worked both in California and Colorado, and are now giving fair returns on the money invested? Although the illegitimate mining of the past has left its traces, and many a wildcat or assessment proposition is still flaunted before the public, mines and different mining methods of to-day have taken on a different aspect and are being run by more competent men, who are pursuing honest business tactics, and it would be well for the investor to study his opportunities and pick out amongst the greater number mining securities that have merit and a chance for future enhancement."

San Francisco Stock Board Sales.

SAN FRANCISCO, April 21, 1898.

9:30 A. M. SESSION.

300 Best & Belcher	32	800 Savage	17
100 Caledonia	20	200 Sierra Nevada	78
100 Gould & Curry	23	100 Standard	1 65
100 Justice	15	250 Union	23
100 Ophir	51	700 Yellow Jacket	13
300 Overman	05		

SECOND SESSION—2:30 P. M.

350 Ophir	52	600 Sierra Nevada	80
600 Gould & Curry	23	200 Utah	08
100 Best & Belcher	32	400 Union	25
350 Con Cal & Va	75	300 Alta	19
100 Savage	16	100 Occidental	2 65
100 Chollar	24	350 N O & C	14
300 Potosi	33	100 Caledonia	20
50 H. & N	46		

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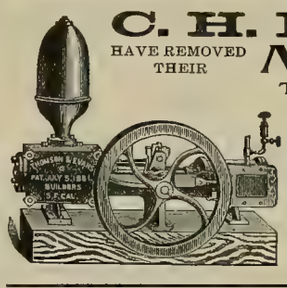
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(U. S. Patents.)

Assessment Notices.

TUBER MINING COMPANY. LOCATION OF principal place of business, San Francisco, California; location of works, Panamint district, Inyo County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 22d day of March, 1898, an assessment (No. 1) of fifty (50) cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of May, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on THURSDAY, the 2d day of June, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

CHURCH GOLD MINING COMPANY. LOCATION of principal place of business, San Francisco, California; location of works, El Dorado, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 23d day of March, 1898, an assessment (No. 1) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary at the office of the company, room 15, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 29th day of April, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 23d day of May, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. P. SWAIN, Acting Secretary.

Office—Room 15, Nevada block, San Francisco, California.

DELINQUENT SALE NOTICE.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 6) levied on the 25th day of February, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Wm. T. Thomas	20	157	157 00

And in accordance with law, and an order from the Board of Directors, made on the 25th day of February, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, room 24, 320 Sansome street, San Francisco, California, on TUESDAY, the 26th day of April, 1898, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. PICHOIR, Secretary.

Office—Room 24, 320 Sansome street, San Francisco, California.

DELINQUENT SALE NOTICE.

THE MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 9) levied on the 19th day of February, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Meta Ecks	102	150	15 00
Gottlob Gall	121	1,000	100 00
Gottlob Gall	122	1,000	100 00
Gottlob Gall	124	300	30 00
Gottlob Gall	125	200	20 00
Gottlob Gall	143	200	20 00
Paul Buhr	212	100	10 00
Joseph Rohrer	279	50	5 00

And in accordance with law, and an order from the Board of Directors, made on the 19th day of February, 1898, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, 237 Twelfth street, San Francisco, California, on MONDAY, the 2nd day of May, 1898, at the hour of 6 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale. F. METTMANN, Secretary.

Office—237 Twelfth street, San Francisco, California.

NOTICE OF ANNUAL MEETING.

JAMISON MINING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California; works, on Jamison Creek, near Johnsville, Plumas County, California.

In accordance with the by-laws of said company, the annual meeting of the stockholders of the Jamison Mining Company will be held at the office of the company, rooms 50 and 54, 120 Sutter Street, San Francisco, California, at 2 P. M., on MONDAY, the 2nd day of May, 1898.

SAM. W. CHEYNEY, Secretary.

Dated March 11th, 1898.

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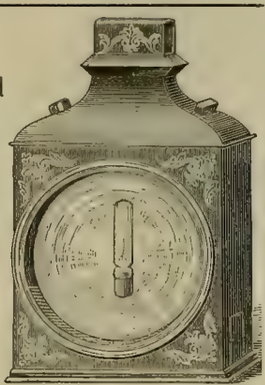
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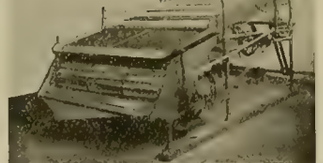
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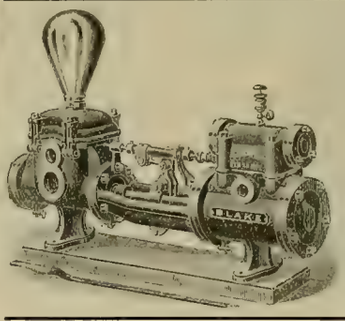


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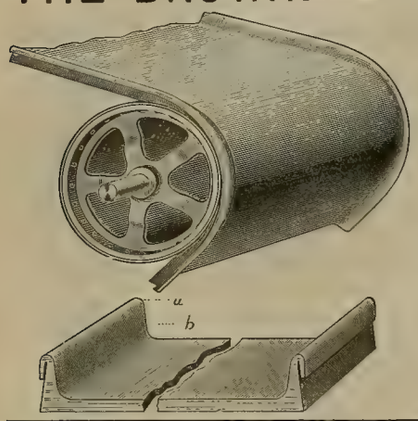
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RAWHIDE GOLD MINING COMPANY,
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J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

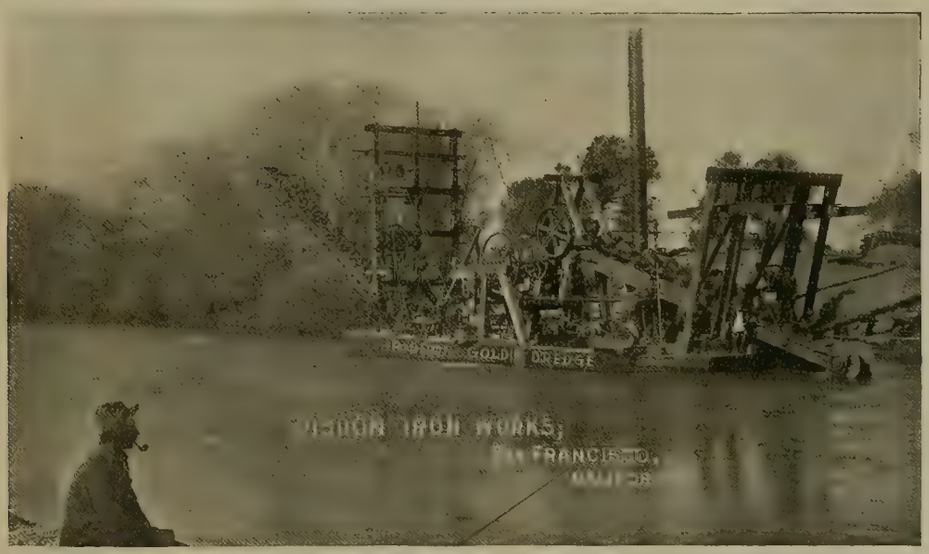
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MR. J. S. BROWNELL—DEAR SIR: I take pleasure in saying that I have used your Patent Lipped flange belt for several years while connected with this company, and I consider them the best that we have used. The quality of rubber in the flange seems to be the best, and we are not bothered with the flange cracking and thereby destroying the life of the belt. At present we are using 14 concentrators, and have in use several kinds of belts. We consider your Patent Lipped flange the best. Yours very truly, THE CONS. SOUTH SPRING HILL G. M. CO.
By JOHN R. TREGLOAN, Superintendent.

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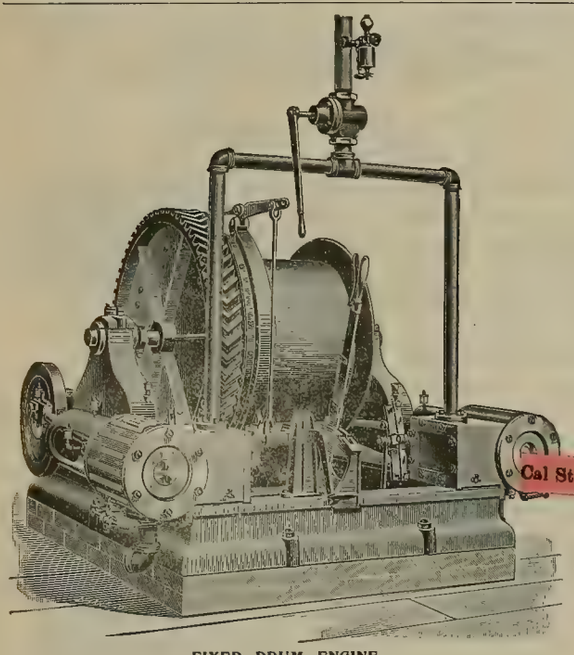
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AND PACIFIC ELECTRICAL REVIEW.

No. 1973.—VOLUME LXXVI. Number 18. SAN FRANCISCO, SATURDAY, APRIL 30, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Concrete Superstructure U. S. Government Breakwater, Cleveland, Ohio.

A Government engineering work of some magnitude is in progress at Cleveland, Ohio, where a breakwater 8200 feet long, to enclose that harbor, was completed by the U. S. Government in 1883. It is constructed entirely of oak cribbing, ballasted with stone. A large part of the timbering, especially near the water line, is in bad condition, and in the report of the engineer in charge in 1896 it was recommended that the work should be repaired by cutting away the old cribbing to a depth of 3 feet below water level and building thereon a substructure of Portland cement concrete. This work was begun last fall and is now being pushed. The Medusa brand of Portland cement, made by the Sandusky Portland Cement Co. of Sandusky, O., was selected by the Government engineers. It is estimated that nearly 80,000 barrels of cement will be required to complete the structure.

The method of construction followed is to make blocks 4x4x10 feet in size of concrete composed of Medusa Portland cement 1, sand 2, gravel 3, broken stone 4. These blocks are made in plank moulds on the piers. When finished they weigh about twelve tons each. After hardening two weeks the moulds are removed and the blocks used like blocks of natural stone, their strength being greater than stone while their cost is not more than one-fourth as great. Fig. 1 shows the blocks lying on the breakwater where they are made, also the floating crane used for placing the blocks in position. Fig. 2 shows the operation of lowering the blocks into place on the old cribbing, cut off below the line of decay. Fig. 3 gives a nearer view of the same and shows how blocks are held and lowered by means of the lifting crabs employed.

After one tier of blocks has been placed in position, bringing the surface foot above the water level, the structure is continued by erecting boxes of plank the full width of the breakwater, and packing concrete into these so as to form a solid mass. Alternate sections of convenient width are first filled, and after hardening, the planks are removed and the intervals filled in the same manner, in just about the same fashion as concrete walls and foundations for houses are built in San Francisco.



FIG. 1.—FLOATING CRANE AND CONCRETE BLOCKS LYING ON THE U. S. BREAKWATER, CLEVELAND, O.

Fig. 4, on page 465, shows a section nearly filled, and crane just about to dump another load of concrete. Fig. 5, on page 465, shows a section of the breakwater nearly completed with concrete parapet erected on the main structure. An experimental section of the work, about 200 yards in length, was completed in the fall of 1897. The results of exposure to an Ohio winter were satisfactory, and the work will be completed in accordance with the plan above described. It is expected that the whole structure will be completed by the end of 1899. The estimated cost of work, including repairs to the piers, is $860,000.

For the illustrations accompanying this description we are indebted to the courtesy of our live contemporary, *Cement and Engineering News* of Chicago, Ill.



1.—MASSIVE LIFTING CRABS EMPLOYED IN LOWERING



FIG. 2.—OPERATION OF LOWERING CEMENT BLOCKS INTO PLACE.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....General Manager

San Francisco, April 30, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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THE Federation of Miners of the West propose establishing a home for aged and broken-down miners. The building is to cost $50,000, and the intention is to have the institution supported by the miners' unions of Arizona, Nevada, Montana, Utah and Colorado. Carson and Virginia, Nev., are talked of as suitable locations. A similar idea has been affirmatively acted upon by the California State Miners' Association, but has not as yet assumed tangible shape.

WHEN the battle ship Maine was sunk in Havana harbor Feb. 15th every American knew that meant war. But we were not ready. In two months tremendous efforts have revolutionized our fighting condition, and with cool courage the nation has been put in proper trim for fight. And now is sounded forth the trumpet that has never called defeat. The next few weeks will change the political map of the Western Hemisphere, forever removing the Spanish flag from the Antilles. The war will have a stimulating effect on the mining industry of the nation, as there will be an increased demand for nearly every mineral product.

SOME one who has given the matter considerable attentive detail figures that it last year cost 90 cents to produce a dollar of gold in California, and that the same amount produced in Alabama cost $3.05 and in Wyoming $5.56. It is also stated that in Colorado it cost but 50 cents to produce a dollar, and in Montana 45 cents. These figures are never authentic and rarely trustworthy. It has been assumed by those who have given the matter considerable attention in every age, and in every nation and community, that every dollar of gold produced cost a dollar. This rule probably holds good in all localities, except the Klondike, where each dollar produced probably costs $5, leaving out the immediate loss of life and the slower suicide of thousands more.

IN connection with the conflict between Spain and this country results another fight of some significance, namely, one between medical science and the yellow fever. The United States Army medical corps has organized to fight that foe, and looks forward with the same hope of victory entertained by the soldiers to vanquishing the scourge of yellow fever when our troops are exposed to its contact. One of the most effective measures relied upon in this instance is the erection of a distilling plant, the daily capacity of which will be 100,000 gallons of water, at Key West, and the construction of steel tanks whereby the water may be carried to the fleet wherever the army or navy go, the idea being that the furnishing of pure water will go far toward prevention of yellow fever. Some anxiety has been felt regarding the possibility of a yellow fever epidemic, resultant upon the return of troops from Cuba carrying it back to this country; but the medical corps say that, with the precautions they are adopting, such a contingency is very remote. At Key West are being established hospitals for the use of United States troops, and the fever is looked upon as furnishing as good an opportunity for a victory for science as for the more noisy fighters by land and sea.

"Contraband of War."

The story of a coal famine in San Francisco need not cause much worry for the present, even if the article has been declared a contraband of war. No one believes that the war with Spain is to last very long. A naval war must of necessity be of short duration. When the fleets of the United States and Spain clash, the work of capture or destruction will be quick and decisive. A more serious complication is the little inducement to send ships to San Francisco this year on account of the poor outlook for grain cargoes. But even if California should have no grain for export next summer and fall, the large number of ships that will be required for Oregon and Washington will compel a large coal fleet to come to the coast, and thus there is a good prospect that we shall have the usual supplies of European and Australian coal. Besides, the coal supplies of this coast are quite adequate to our wants without a cargo from other places.—S. F. Bulletin.

Coal has never been definitely decided upon as a fixed contraband of war, although this country passed a law in May, 1862, declaring it so. Prior to the civil war there never had been necessity for agreement upon coal. International lawyers are divided upon this point, but generally admit that as England has recently declared coal to be contraband other nations will take like action should occasion arise.

Chief Justice Chase ruled that contraband goods are divided into three classes: First, articles manufactured for military purposes; second, articles which may be used for war or peace, according to circumstances; third, articles exclusively used for peaceful purposes. In order to constitute contraband of war it is necessary that there should be hostile quality and a hostile destination. Where non-contraband articles are part of a cargo with contraband goods, they may be seized. Collectors of customs may refuse clearance papers to ships of any nation destined for enemies' ports.

The following articles are recognized as contraband of war: Cannon, firearms, rosin, sail cloth, clothing for uniforms, hemp and cordage, ship lumber, tar and pitch, ardent spirits, iron, lead, copper, tin, brass, wire, platinum, horses, printing presses, paper, postage stamps, sulphuric acid, zinc, marine engines and like machinery.

Provisions sent to belligerents are not in general deemed contraband unless destined for military use. Corn, flour and meal are only contraband in siege, blockade or investment. Money sent to belligerents for payment of goods purchased is not contraband, but is if sent to assist belligerent operations. Cotton was considered contraband during the civil war, as it was used as collateral.

IN Denver, and elsewhere in Colorado, it is seriously suggested to abolish the mining stock exchanges of that State, or at least suspend their operations for a time. Abuse of privileges, selfish and at times dishonest manipulation of stocks go far to justify such a feeling among those who believe in working the mine, and not the street, on the ground that such action on the part of mining brokers is inimical to the true mining interests of the community. But because of the abuse of such an institution, its manifest advantages should not be overlooked. Rightly managed, a stock exchange is of value as the central barometer of and readiest market for mining stocks. There is a recognized value to many mining stocks and there should be a recognized center for transactions therein. In this case it would seem that it is not abolition but reform that is most needed.

California's Gold Yield for 1897.

Through the courtesy of Charles G. Yale, statistician of the U. S. mint at San Francisco, the following is published herein:

The superintendent of the U. S. mint in this city has forwarded to the director of the U. S. mint at Washington the report on the product of the precious metals in California for the calendar year 1897. This report is based on the returns received from producers in answer to inquiries sent out from the local mint. As compared with figures obtained from the same source in 1896, the gold yield of the State shows a falling off of $1,310,161, while the silver shows an increased product of $30,325, commercial value, making the total decrease for the year 1897 from the preceding one $1,279,830. The yield of the State by counties is as follows:

PRODUCT OF CALIFORNIA BY COUNTIES, 1897.

RECAPITULATION.

County—	*Gold.*	*Silver.*	*Total.*
Amador	$ 1,324,473	$ 3,477	$ 1,327,950
Butte	667,025	7,885	674,910
Calaveras	1,439,861	1,745	1,441,606
Del Norte	16,710	.....	16,710
El Dorado	674,626	886	675,512
Fresno	43,144	.....	43,144
Humboldt	94,992	57	95,049
Inyo	159,840	50,063	209,903
Kern	754,313	10,471	764,784
Lassen	49,100	850	49,950
Los Angeles	40,698	.....	40,698
Madera	85,963	.....	85,963
Mariposa	451,427	660	452,087
Mono	520,101	72,491	592,592
Nevada	1,885,251	8,116	1,893,367
Placer	1,524,941	6,784	1,531,725
Plumas	339,352	701	339,953
Riverside	147,227	4,000	151,227
Sacramento	93,050	.....	93,050
San Bernardino	100,373	54,407	154,780
San Diego	592,328	.....	592,328
San Luis Obispo	2,500	.....	2,500
Santa Barbara	3,000	.....	3,000
Shasta	569,071	96,869	665,940
Sierra	370,208	46	370,254
Siskiyou	842,123	34	842,157
Stanislaus	37,392	.....	37,392
Trinity	1,078,372	259	1,078,631
Tulare	12,830	214	13,044
Tuolumne	1,809,572	1,696	1,811,268
Yuba	141,638	.....	141,638
Undistributed	.....	131,073	131,078
Totals	$15,871,401	$452,789	$16,324,190

In 1896 there were seven counties of the State which produced over a million dollars, and one of these yielded over two millions. In 1897 there were but six of the million dollar counties, and none of them reached the two million mark. Nevada county, which held the place of honor in 1896 in bullion product, still maintains its position in 1897; but Tuolumne county, which ranked No. 7 in 1896, takes second place this year, displacing Placer, which is now third on the list. Calaveras, which was third, is now fourth in rank. Amador also drops back one place, being now fifth instead of fourth. Trinity, which was fifth last year, is sixth in 1897, holding the place that Siskiyou did the previous year, the latter county dropping out of the list of million dollar producers for the time at least.

Investigation has been made into the origin of bullion—whether from alluvial washings or veins. It is found that vein mining very greatly leads not only one but all forms of gold washing combined. The figures for California in 1897 are as follows:

Quartz mining, $11,390,130; surface placers, $2,379,914; hydraulic mines, $1,351,088; and drift mines, $1,203,058. In the quartz total is included the silver output of $452,789 (commercial value). From copper ores (included in the quartz column) the product of gold was $149,406, and of silver $95,928. From the silver-lead ores, mainly in Inyo and Mono counties, the gold product was $44,801 and the silver $54,100.

Deducting these amounts of silver derived from the lead and copper ores, the remainder of the total was obtained by separation from the gold derived from quartz, placer, hydraulic and drift mines—that is, of the total gold, $194,207 was derived from copper and lead ores and $150,028 silver was derived from the same source.

Figures collected by the Mint also show approximately the number of men engaged in precious-metal mining in the State for the year 1897. The number given is 16,783, as compared with 16,790 in the previous year.

Magnetic Concentration of Ores.

Considerable space in this paper has been devoted to notice of the magnetic concentration of ore in New Jersey, and more recently is noted preparation for what is said to be "magnetic" reduction of gold ore to be operated by Mr. Edison on a large scale in New Mexico.

There is something attractive in the subject, and it is receiving considerable present attention. In the March number of Cassier's Magazine is an article on the "Magnetic Concentration of Ores," by Prof. W. A. Anthony, which gives much of technical value. He cites some of the earlier forms of magnetic separators, necessarily crude, for, as he instances, until the invention of the dynamo machine reduced the cost of electrical energy, inventors and users of such separators generally had to content themselves with such results as could be obtained by the use of permanent steel magnets.

A few magnetic separators have been constructed in which the magnetic poles are placed in the passing stream of mixed materials. The magnetic particles are arrested by the magnets and gradually accumulate upon them. This accumulated material must then be removed from time to time; otherwise the magnets would become overloaded and would no longer perform their office.

Such a construction, says Prof. Anthony, could not be used, except where the quantity of magnetic material is very small. Where considerable magnetic material is present, the separator must be so constructed that it may be continuously removed. While such separators are all constructed upon the same underlying principle, as stated above, they may be roughly divided into two classes: one in which the mixed material is carried around, or in front of, the poles of a magnet and in which the magnetic portion is deflected from its course sufficiently to be deposited in a receptacle by itself; and the other in which the magnetic material, spread out upon an apron or similar carrier, passes in front of a magnet which picks up the magnetic portion, which is then, by the movement of the magnet itself, or by means of a supplementary carrier, removed to the receptacles provided for it.

Separators of the first class have taken various forms. In Fig. 1 the material to be operated upon,

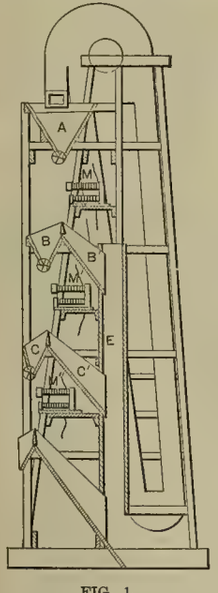


FIG. 1.

in the form of coarse powder, having been passed through a sieve to separate all stones and lumps, is conveyed to the hopper *A*, from which it falls in a thin sheet in front of a magnet, *M*, which is so adjusted that it merely deflects from its course, but does not attract to itself, the most strongly magnetic material. This then falls into the chute *B'*, while the undeflected portion falls into the hopper, *B*, from which it drops, in a thin sheet, in front of the magnet *M'*. The latter is so adjusted as to act upon magnetic material that is too weak to be drawn by the first magnet and so produces a further separation. The material which passes *M'* without deflection goes into the hopper *C*, and is then subjected to a further separation by the magnet *M''*.

More than one magnet is necessary in this apparatus, because if the first magnet were placed sufficiently near the falling sheet to take out all the magnetic material, the strongest of this would be so strongly attracted to the magnet and cling to its face.

Fig. 2 shows two views of another form of separator of the first class. Here the two cylinders, *B* and *B'*, are supposed to be rendered strongly magnetic by means of the horseshoe magnets marked *AA*. With such a construction the greatest strength would exist in the region between the two cylinders

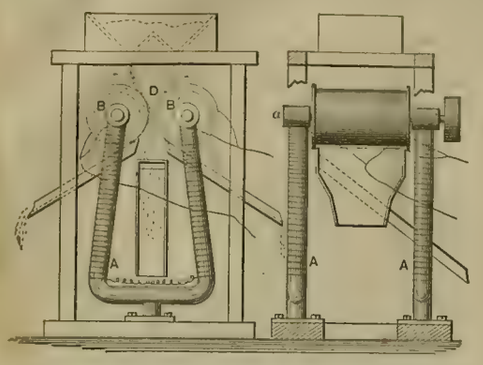


FIG. 2.

where they most nearly approach each other. From this point the magnetic strength would grow rapidly less as the cylindrical surfaces recede from each other, until a point would be reached where it was no longer sufficient to retain the magnetic material which would then be deposited as the figure shows.

Figs. 3, 4 and 5 represent a separator of the second class. The magnets *G*, having plates *F'* to serve as poles, are supported above an apron, *D*, upon which the mixed material is spread in a thin sheet. As this apron passes beneath the magnet, the magnetic material is picked up and held against the under side of a transversely moving apron, *C*, until it is carried beyond the edge of the apron *D*.

Then, as it leaves the region of the magnetic action, it drops into a receptacle, as shown in Fig. 4. The non-magnetic material remains upon the apron

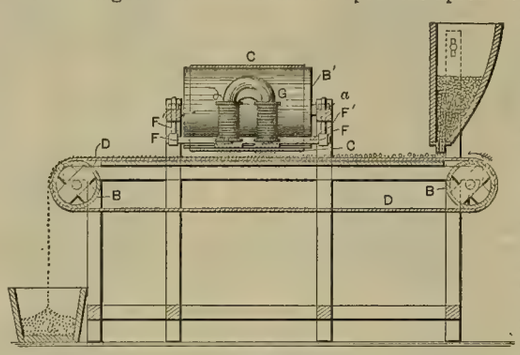


FIG. 3.

D, until it passes over the pulley *B*, when it is deposited, as shown in Fig. 3.

In this form of separator the apron *D* is often considerably lengthened and three or four magnets and transverse aprons follow one another over it, each succeeding magnet being placed a little nearer to the apron *D* than the one that precedes it. In this way magnetic material that has escaped the first magnet may be picked up by the second, and so on.

As already stated, until a very recent date separators have been designed with reference to the removal from a mixture of substances that are quite strongly attracted by the magnet. Indeed, it had not been recognized until very recently that the feebly-attracted minerals were amenable to magnetic separation at all. The magnets represented in the separators so far described would not at all answer the purpose of removing these very feebly attracted substances. Why attempts were not made earlier to attract upon the feebly magnetic minerals will be understood when it is remembered that there are two distinct classes of substances attractable by the magnet with a very wide gap between. Taking the attractability of iron at 100,000, that of magnetite is about 65,000, while the feebly attracted minerals run from 40 to 150, forces which, compared to that of magnetite, are infinitesimal. Of all minerals pyrrhotite only is comparable to magnetite in magnetic strength, and even it is much weaker than magnetite. Had there been a regular gradation in magnetic attractability from the substances of the first to those of the second class, it is probable that means would long ago have been found for grading the action of magnetic separators and of developing the strength necessary to deal with the feebly attracted minerals.

But in consequence of this very wide gap unoccupied by substances having an intermediate attractability, practical engineers have not recognized the feebly attracted minerals as exhibiting any force at all. Or, if they knew of the existence of these feeble attractions, it is no wonder that they did not consider them practically available for magnetic separation, when it is remembered that the magnets that successfully separated the recognized magnetic substances would have to be increased in strength from 500 to 1500 times in order to deal with the minerals of the other class.

Some inventors, in order to separate the more feebly magnetic ores of iron, have proposed to convert these ores into magnetite by roasting. But this process, although successful with certain ores, is not always applicable, and, moreover, is costly.

Such a process was employed for separating the iron-bearing minerals from the zinc ores of the Franklin mines of New Jersey and was, to a degree, successful; but the expense of the process led J. P. Wetherill of the Lehigh Zinc and Iron Co. of South Bethlehem, Pa., to institute a series of experiments looking to the direct magnetic concentration of these ores without the preliminary roasting.

To understand the difficulties and discouragements that beset the experimenter, it must be understood that none of the constituents of the ore of the Franklin mines had ever been recognized as attractable by the magnet. The ore is known as franklinite ore, and

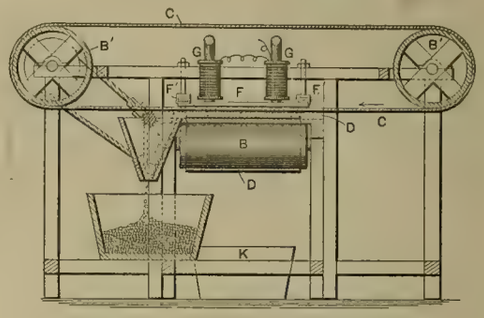


FIG. 4.

is an aggregation of several minerals: franklinite, a mineral containing zinc, iron and manganese; willemite, a silicate of zinc; zincite, an oxide of zinc, together with calcite, garnet, and a number of others. The principal object is to obtain the willemite and zincite free from the franklinite, as the presence of the latter is a fatal obstacle to the reduction of these zinc ores in the Belgian furnaces.

The fact that the franklinite could, by roasting, be rendered sufficiently susceptible to magnetic attraction to be removed by the separators then in use, suggested that it might be somewhat magnetic in its natural condition. But, tested in the ordinary way, it showed no evidence of magnetic susceptibility, and it was only after repeated trials by the strongest hand magnets that Mr. Wetherill found that, now and then a fine grain of franklinite could be lifted out of a mass of powder. This was, however, sufficient to demonstrate the attractability of the mineral, and the problem now was to obtain the magnetic strength required for its separation on a commercial scale.

No assistance toward the solution of this problem was furnished by the then existing magnetic separators. On none of these would any amount of current in the magnet windings give a magnetic strength that would produce any impression whatever upon

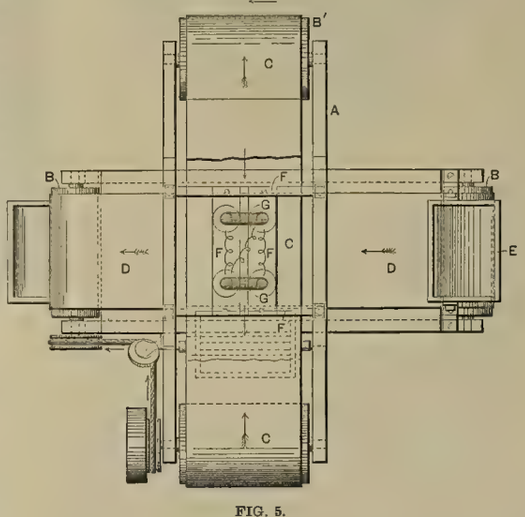


FIG. 5.

the franklinite ore. It was evident that, for obtaining a very intense magnetic field, the design of the magnets in existing separators was radically wrong.

The principles that underlie the construction of electro-magnets may be stated in a few words. A coil of wire carrying a current possesses a power to develop magnetic force which is measured by the product of the number of turns in the coil and the

strength of current flowing in it. This product represents "ampere-turns," and is a measure of the "magneto-motive force" of the coil. Such a coil develops a magnetic force which is assumed to be represented by "lines of force" forming closed curves, linked into the coil. As a further assumption, a line of force is taken to represent a unit of magnetic force, so that the number of lines through a given coil represents the total magnetic effect of that coil, and the number of lines passing through unit area at any point, represents the strength of the magnetic field at that point.

The total number of lines developed by any coil is the quotient of the magneto-motive force of the coil and the reluctance of the magnetic circuit. This reluctance is a quantity akin to resistance in an electrical circuit, and may be considered as representing the opposition offered by the material filling the space occupied by the lines, to having lines of force set up in them. The reluctance of air is high, and of iron, when far from saturation, very low.

An electro-magnet consists of a coil of wire surrounding an iron core usually having a horseshoe form. The magnetic effects are exhibited in the air gap separating the ends of the horseshoe. In order that these effects may be intense, it is necessary that the number of lines per unit area in the air gap should be large.

To obtain a large number of lines requires a great magneto-motive force and small reluctance. To obtain a small reluctance requires a large mass of iron far from saturation by the magnetic lines developed. But to obtain intense effects requires a large number of lines per unit area of air gap. Hence, the area of air gap must be small.

It can now be understood why the early magnetic separators failed to produce a field of such intensity as to act upon the feebly magnetic substances. Referring to Fig. 2, the iron cores of the magnetizing coils are long and of small area; hence, they have a high reluctance. The air gap area is a rectangle whose length and width are at least equal to the length and diameter of the polar cylinders. This area is, therefore, many times the cross section of the magnet cores, and the lines of force which would saturate the cores would be thinly distributed over this air gap.

So with the magnets of Figs. 3, 4 and 5. There are two magnet cores having for common pole pieces the long flat plates, *F*. The effective magnetic field, as shown in Fig. 3, has an area equal to the entire under surface of these plates, which is many times the area of the cross section of the magnet cores.

Even if the two magnets were as close together as possible, and the plates as short as such a distance would admit, their area would still be many times that of the cross section of the cores, and all the lines that could possibly pass through the cores would be but thinly distributed when scattered over the surface of the plates.

These examples show not only no attempt to concentrate the lines of force and so produce intense magnetic effects, but it would seem from them that the purpose of the inventors was rather to distribute the force over as large as possible a region.

Fig. 6, from a patent appearing as late as 1893,

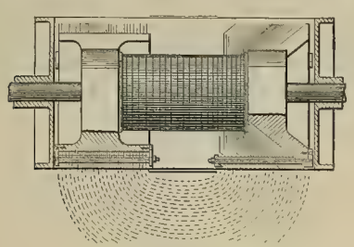


FIG. 6.

shows this plainly. Here the inventor makes his pole pieces of thin sheet iron, set edgewise and spaced at unequal distances with the avowed purpose of obtaining an even distribution of the lines of force over the entire area. Here, again, the air gap area is many times larger than the cross section of the magnet core.

Now, in order to produce that intense magnetic field that is needed to operate upon the magnetic materials of the second class, the course pursued must be the exact opposite of that which the figures referred to exemplify. Instead of small magnet cores and large air gap area, there should be large magnet cores and small air gap area—large magnet cores to reduce the reluctance and permit of the production of a large number of magnetic lines, and a small air gap area through which all these lines must pass, and in which, therefore, they are crowded together, which is the same thing as saying that the magnetic force is intensified.

It was left for Mr. Wetherill to fully appreciate these principles of magnet construction and to apply them in practical form to the construction of magnetic separators. Figs. 7 and 8 show one of the forms which the Wetherill separator has taken. The pole pieces, *C*, are shown to be beveled to a thin, rounded edge, and brought near together. The working air gap is the narrow space between these polar edges, and is, therefore, very short and of small area, the latter being practically represented by a rectangle whose length is $x\ y$, as seen in the horizontal section, and whose width is the thickness of the edges of the pole pieces, as seen in *A* in the side elevation.

Through this very small area pass nearly all the

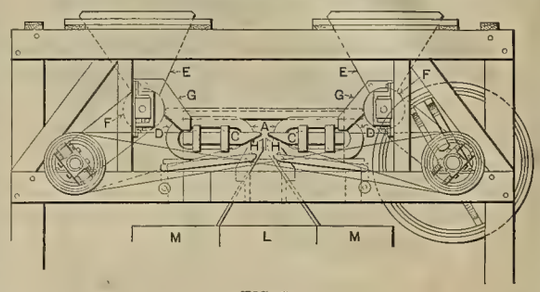


FIG. 7.

lines of force developed by the large magnet coils through the heavy magnet cores and yokes which form the rest of the magnetic circuit, and present a very small magnetic reluctance. It will be noted that the air gap area is here much smaller than the cross section of the magnet cores, instead of being many times larger, as in the earlier separators; and from this results the enormous concentration of magnetic force.

Into and through this intense magnetic field the ore to be acted upon is passed. But all this will be better understood if the complete operation of the

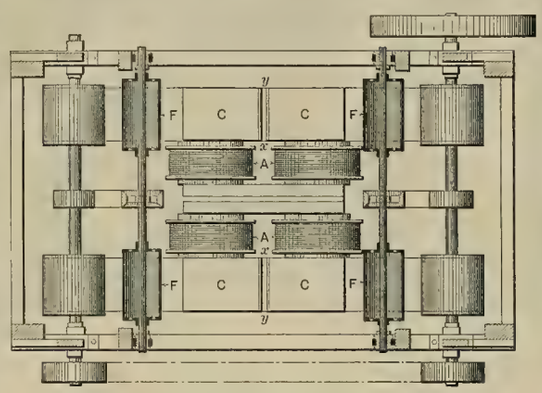


FIG. 8.

apparatus is described. The mixed material in coarse powder, sized by passing over suitable screens, is brought through troughs, *E*, Fig. 7, which is taken from a machine regularly installed for operation, to the rollers *F*. By these rollers the material is fed through the troughs *G*, in a thin layer upon the belts *D*. These travel toward the gap and pass by friction around the rounded edge and along the beveled lower face of the pole pieces, as shown. The material on the belts, therefore, passes directly through the gap at *A*, almost in contact with the rounded edge of the pole pieces, where the magnetic force is most intense.

Material that is absolutely non-magnetic drops vertically from the pole pieces beween the shutters *HH'*, into the receptacle *L*. Material that is at all attracted is carried by the belt partly under the rounded edge, and, if sufficiently susceptible, may even be carried on to the beveled under surface of the pole pieces; but it will sooner or later reach a point where the magnetic force is too weak to hold

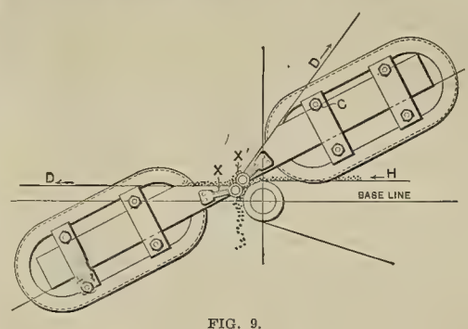


FIG. 9.

it, and it will then drop off. It will, therefore, be seen that by properly adjusting the shutters *HH'*, this magnetic material may be guided into the receptacles *MM*.

The pole pieces in these machines are adjustable, and the air gap, *A*, may be made wider or narrower, thus varying the magnetic intensity. This intensity may also be varied by varying the current in the magnetizing coils. By these means the apparatus may be adapted to the separation of materials varying greatly in magnetic permeability. Indeed, a series of these machines may be so adjusted as to separate from a mixture of materials of varying permeability, first, that of the highest, second, that of the next highest, and so on until the different materials are all separated and classified in the order of their attractibility.

The machine above described is best adapted for dealing with materials in the form of coarse powder. For operating upon material in fine powder a somewhat different arrangement of the magnets is found necessary. Such an arrangement is shown in Fig. 9.

The magnet poles are here inclined, with their beveled faces upward. The finely divided material is brought by the belt *H* into close proximity to the air gap where the magnetic material is, as it were, picked up, most of it going to the rounded ege of the left-hand pole piece, when it is carried by the belt *D*, moving in the direction of the arrow, upward through the gap and to the left over the pulley around which the belt passes.

Some of the material may go to the right-hand pole piece and be carried by its belt a short distance up the steep incline, as shown at *X'*; but the magnetic force very rapidly becomes weak as the distance from the edge increases, and this material soon falls back down the incline, and finally falls over on to the left horizontal belt and is carried away to its proper receptacle.

It will be seen that the separators represented in Figs. 7 and 8 are separators of the first class, in which the material is carried into a magnetic field by which the magnetic portion is deflected from the course it would otherwise follow, while the separator of Fig. 9 is of the second class, in which the magnetic material is lifted out of the mixture and is then carried away by a supplementary carrier.

As has been said, it was the necessity for separating the iron and manganese-bearing minerals from the pure zinc-bearing minerals of the franklinite ore that led to the development of these powerful magnetic separators; but it was soon found that the extraordinary magnetic power that could be achieved by properly designing magnets along the lines pointed out, was sufficient to permit the separation of substances far less susceptible than even franklinite. Hematite, siderite, garnet, pyrolusite and others could be separated from deleterious substances, or from ores in which they are themselves objectionable ingredients. Manufactured salts of iron, manganese and chromium are affected by these machines.

These Wetherill separators are in operation at the Sterling Iron and Zinc Co.'s mines at Franklin furnace, New Jersey, in a plant capable of handling 300 tons of ore per day.

Cripple Creek Milling Facilities.

A conservative estimate places the Cripple Creek ore output at 27,000 tons per month, about 9000 tons of which are shipped to the smelters at Denver and Pueblo, leaving approximately 18,000 tons per month to be milled by cyanide and chlorination. There are seven milling plants in the vicinity which operate almost exclusively on Cripple Creek ores; name and capacity of each being given below:

	Tons per day.
Brodie, cyanide	100
Colorado-Philadelphia, chlorination	220
Gillett, chlorination	60
Arequa, chlorination	75
El Paso, chlorination	100
Metallic, cyanide	300
Kilton, chlorination	30
Total capacity	885

Thus the milling capacity is 26,550 tons per month about equal to the output of the entire district. The smelter consumption of high-grade ores being about 9000 tons per month makes it necessary for some of the mills to run at much less than full capacity, or seek ores from other districts. It is estimated that the mills generally effect a saving of about 88 per cent of the values, and that the average value of mill ore treated is about $25 per ton.

The Brodie, Gillett and Arequa plants are located in the district; the Colorado-Philadelphia is at Colorado City, while the El Paso, Kilton and Metallic are at Florence. Those at Florence and Colorado City use crude oil as fuel, those in the district using coal.

The superior smelting and milling facilities encompassed within a radius of sixty miles makes an open market that constantly assures the producer full value for the product of his mine, and the competitive transportation facilities tend to the same result.

Cripple Creek, April 23rd, '98. WASCOTT.

THE desirability of bringing all scientific facts in relation with a single "international" standard of latitude cannot be too strongly insisted upon. It has often been pointed out that there are many discrepancies in "accurate" statements of boiling temperatures, absolute weights, etc., due to the want of a universal standard latitude, with regard to which "normal" barometic pressure should be fixed.

Treatment of Slimes.

NUMBER IV.—CONCLUDED.

The anode has attracted a good deal of study, but the subject of the cathode is not less interesting and important. Many substances have been tried, which have performed their functions more or less completely. Lead has been used in thick plates, in thin sheets, in ribbons or strips, and in the form of shavings, while zinc has been used in the form of amalgamated plates and as shavings, amalgamated copper plates have similarly been tried, together



FIG. 4.—CRANE DUMPING CONCRETE IN SECTION NEARLY FILLED, U. S. BREAKWATER, CLEVELAND, O. (*See page 461.*)

with iron plates and various other forms of iron; and the same with mercury. Zinc, copper and iron in various forms have been utilized by Mr. Andreoli for this purpose; mercury is in use in the United States in the Pelatan-Clerici process; on these fields at present lead strips and lead shavings are in use; and zinc shavings are used by Mr. Bettel at the Comet. Each of these various cathodes have their peculiar advantages. Lead strips are used every-



FIG. 5.—SECTION COMPLETED AND CONCRETE PARAPET ERECTED ON MAIN STRUCTURE, U. S. BREAKWATER, CLEVELAND, O. (*See page 461.*)

where in the plants using the Siemens process except at the Central Works, where part of the boxes are charged with lead shaving; and at the Comet zinc shavings are in use.

In the actual running or precipitation of the liquid in the Siemens and Halske box, there are only a few things to which it is necessary to give attention. Having set the current and knowing the capacity of the precipitating plant for a certain grade of solution, all that is required for the period of one or two months is at the commencement to see that the connections have been properly cleaned and are in order, then to keep a constant flow of clear liquid through the box, then to see that the same current is maintained throughout, after which no further attention is required. The guide as to when the clean-up should be made is the condition of the cathode. The cleaner the cathode can be kept the larger will be the amount of gold that can safely be precipitated upon it; and the steadier the current is kept, the more solid and perfect will the planting be. So long as the surface of the lead remains clean and the coating regular, so long the precipitation of the gold will take place; but under ordinary circumstances, such as prevail in our precipitating plants to-day, it is not usually advisable to retain the lead in the boxes for more than two months. Possibly, if the lead can be kept clean, three months might be given to the lower boxes, because they are generally cleaner than the upper boxes; deposition of the lime and other substances that tend to destroy the efficiency of the cathode is most apparent in the head boxes.

General Conclusions.—It is but just to state in this connection that the name of Adolf von Gernet will always be associated with the introduction of the electrolytic process in this country, and also that among the practical workers in electro-deposition on the Witwatersrand no name is better known than that of M. Torrente, while G. Andreoli is coming rapidly forward as an electro-metallurgist.

With regard to the future, the present rapid reduction in working costs of slimes treatment, and the increasingly high percentage of actual extraction, make it appear possible that the aim of the metallurgist will soon be to increase the percentage of the slimes produced by the mill rather than to restrict it as in the past. This will involve a continually decreasing average size of concentrate and sand particles, with consequently lower residues and less gold remaining therein, which gold has not been extracted, simply because it is inaccessible both to the action of mercury and cyanide.

We may look upon the slimes treatment as it has been developed in this country by the members of this society as a new metallurgical process, which will be adopted all over the world, and I think that its main features will be practically retained. The use of lime for settlement, the use of spitzkasten for collecting, tanks for "natural settlement," dissolving the gold by means of agitators or centrifugal pumps, the decantation of the liquid, and the precipitation by electrolytic method are, I think, permanent features, which in detail may be modified to some extent, but which will remain with us. I do not believe that any system of vacuum presses, filter presses, or pressure filters of any sort will ever be used in the treatment of battery slimes; in other words, I do not think that any form of leaching will over displace the methods that we have in use at present. It may appear a somewhat complacent way of look at acceptod methods to state that one thinks present methods will not be displaced, but merely expanded. But, nevertheless, it must not be forgotten that every problem has its necessary limitations, and while there may be many startling innovations proposed, the methods that we have before us to- day in actual work are the survival of the fittest of many attempts, in which there are many more records of failures than of successes.

I think that the members of this society may be congratulated on having carried out the truly great work that I have attempted to describe, and much credit is likewise due to the far-seeing capitalists who have had the pluck and determination in the face of many failures to furnish the money which made possible the economic solution of the slimes problem.

A New Explosive.

The *Revue Technique* describes an explosive invented by T. Jewler, named "Promethee," which is manufactured on different lines from the explosives in ordinary mining use, being composed of separate solid and liquid elements in themselves non-explosive and only detonating when jointly combined. The solid portion is made up of the following: Chlorate of potash 56%, manganese dioxide 20%, ferric oxide 24%. This is triturated, mixed in a mill and filled into cartridges, a permeable cartridge paper being employed to facilitate the penetration of the oil, which consists of: Petroleum 50%, oil of turpentine 40%, oil of bitter almonds 10%. This prepared liquid —which is not applied to the cartridges until just before use—is stored in metal flasks holding about one-tenth of a gallon: 2.2 lbs. of the explosive contains 1.65 lb. of cartridge contents and .55 lb. of the oil, this quantity being sufficient to impregnate the cartridge. The cartridges, before they are steeped in the oil, are non-inflammable and non-explosive, even by shock from steel plates. They are, it is said, unaffected by frost, moisture, or sudden changes in the surrounding medium, and do not undergo any change during storage. The oil is not readily inflammable, and, when ignited, burns quietly with a smoky flame. However, when impregnated with oil—which takes about fifteen minutes—the cartridges, on ignition, burn quietly with a brilliant flame, and disengage a large volume of gas. Percussion between two plates of steel will explode them, as will also an ordinary detonator. No other means of causing an explosion is possible, and cartridges fitted with detonators may be placed in the vicinity of others that are being exploded without themselves going off. Moreover, when the impregnated cartridges are dried again, they return to their non-explosive condition. It is claimed that the disruptive force exerted is at least as great as that of dynamite; also that it is directed in the line of greatest resistance, and acts with equal efficiency in dense rock, light-fissured rock, and in water. No soot is left on the walls of the boreholes, and direct experiment has shown that the cartridges may be fired in presence of inflammable or explosive gases like fire-damp without danger.

THE cry of a magician in Aladdin, "New lamps for old!" is matched in a story told by M. Philippe of Paris. It appears that a Russian loan of fifty million francs was taken up by Rothschild in 1836. M. Poizat, a French chemist, discovered that the older Russian silver coins contained a large proportion of gold, and he having entered into relations with Rothschild's, the latter stipulated that the loan should be repaid in old silver. The unsuspicious Czar acceded, the wily chemist recovered the gold from the melted silver, and shared the profit with Baron Rothschild. The Emperor Nicholas subsequently learned the fact and sent for M. Poizat to St. Petersburg to install a similar laboratory to deal with the remaining old coinage, from which expedition the French chemist returned loaded with honors. This recalls the fact that Dr. Emmens makes argentaurum from Mexican dollars, probably of primitive manufacture.

A Montana Tailings Plant.

The Helena, Montana, *Independent* says: C. W. Merrill furnishes a New York paper with the following description of the tailings plant of the Montana Mining Co. at Marysville:

The tailings beneficiated during the preceding summer by the new cyanide plant of the Montana Mining Co., the largest in operation in this country, were taken from what is known as their No. 5 dam. This bed, the lowest of the five situated in Silver gulch, is about six miles below Marysville and contains a much greater proportion of slimes than the upper beds, owing to the fact that it has been largely used for the final settling and clarifying of the water. The first step in the process of treatment, that of putting the material in suitable shape for leaching before loading it into cars, is, therefore, one requiring considerable care. In order that this point may be perfectly clear, it should be explained that in the operation of any plant for lixiviating tailings the material handled from day to day should be as nearly uniform in fineness as it is practicable to obtain it, and also that as few slime lumps as possible should be charged into the leaching vat, because they are not only impermeable to the solution, but soak it up and do not release the values. To accomplish this preparation the bed is plowed, harrowed and worked over continuously in order to dry and partially pulverize the lumps. The further precaution is observed of so selecting the material from different areas on the bed as to give comparatively uniform leaching charges each day. The installation of a disintegration plant to completely pulverize the slimes is now contemplated, and by this means a fixed proportion of pulverized slimes can be added daily to the charge.

The second step, that of loading the cars, is accomplished in the old Mormon fashion, using traps or bridges over railroad cuts and scrapers for moving the material. The pattern of the latter is known as the "Fresno buck" scraper, and the economy and advantage of their use will be appreciated by contractors when it is stated that we have been loading approximately 400 cubic yards per day with six men and twelve horses, with an average haul of not less than 100 feet. The use of the steam shovel in this work is practically prohibited by the fact that the material should be somewhat dried and pulverized on the surface of the bed before loading, in order to secure the best working results.

The cars used are of three tons capacity, with bottom discharge, and sixteen loaded cars make the train for a 22-ton locomotive. The latter is of the saddleback tank type, 9-foot wheel base, with six driving wheels carrying all the weight. The rails are 56-pound Northern Pacific pattern. The gauge is 3 feet, the maximum curve thirty degrees, and maximum grade 3.5 per cent.

The plant is two and a half miles above No. 5 dam, and the tailings after leaving the cars pass in an almost continual stream to the sheet iron lining of the bins and out of the gates to a 24-inch four-ply belt conveyor, which conducts them to a revolving chute or distributor; and this in turn fills a vat 38 feet in diameter by 9 feet deep with 400 tons of tailings in about eight hours. The great advantage of filling a tank in this way is that it gives a charge of more uniform permeability than any other method known to the writer.

There are four of these tailings vats, each with its bin, conveyor and distributor, and one is charged daily, thus giving four days to complete the treatment of each charge, which consists in saturation lixiviation, washing and discharging. The latter is accomplished by sluicing with two 2½-inch hose, the water being under a 60-foot head, through four side discharge doors and one bottom discharge gate in the center of the vat. By this method 400 tons are discharged in three hours or less at a total cost of less than two cents per ton.

The solution tanks are ten in number and consist of four precipitating tanks of California redwood 22 feet in diameter by 14 feet 9 inches deep, and two storage or supply tanks 38 feet in diameter by 9 feet deep. There are also two water tanks 22 feet by 14 feet 9 inches, for the storage of 80,000 gallons of water. The power equipment consists of a 50 H. P. boiler, one 25 H. P. engine, one 10 H. P. engine for running conveyors, one 30-light dynamo, one Knowles economical geared pump having 4-inch inlet and discharge, two Worthington all iron duplex solution pumps, 5-inch suction and 4-inch discharge, and one two-drill air compressor.

The tailings are the lowest grade in gold of any now worked in this country and are rebellious, containing copper carbonates and sulphide tetrahedrite, arsenical polybasite and ruby silver. The plant operates under very unfavorable climatic conditions, being in the most northern latitude of any known to the writer, but in October and November it exceeded the predictions of profit by nearly 50 per cent and netted about double the return the company considered would justify the erection of the plant.

A "TENDERFOOT," if a good, enterprising man, is welcomed in any of the old camps, says a correspondent of the Denver *Daily Mining Record*. A newcomer is not subjected to the trials and experiments of the pioneers, who were also tenderfeet, but can gain information in a few days which was acquired by them at the cost of years of labor. And sometimes newcomers, by bringing unbiased minds to bear on the question, solve problems over which the old-timers have worried in vain. Instances are cited in which bankers and other business men, entirely unused to mining, have met with success from the start. Mining is not so unlike other kinds of business that a man of good business ability may not avail himself of efficient assistants and run a mine successfully. Many men who are now selling goods at a loss might go into the mountains and mine gold at a profit. If they do not become millionaires, they might at least earn a good living, and in time acquire a competence.

An Interesting Electrical Experiment.

An interesting experiment in high-voltage, long-distance electric power transmission, pregnant with influence on all transmission work, was recently made at Ogden, Utah, in order to ascertain the limits within which high-voltage currents might be used commercially. The experiment was made by Mr. F. O. Blackwell, of the General Electric Company, over the lines which connected the great power station of what was, until recently, the Pioneer Electric Company at Ogden, with the distributing circuits at Salt Lake City, and consisted in connecting the Salt Lake ends of the transmission lines together and dividing the transformers at Ogden, normally used for raising the pressure of the current for transmission, into step-up for the outgoing current and step-down for the incoming. The distance from the power station at Ogden to Salt Lake City is about thirty-six and a half miles. Making a complete circuit of the outgoing and incoming lines, therefore, with Salt Lake City midway, gave a complete transmission circuit of seventy-three miles over three No. 1 wires. The amount of power transmitted amounted to 1000-horse power, and the voltage at which the transmission was effected reached at times as high as 30,000 volts. The current on the return was delivered to resistance vats at the power house, consisting of three wooden tanks.

By careful and repeated measurement with watt meters at both ends, Mr. Blackwell ascertained that this power was transmitted with the loss of only nine per cent, including four per cent loss in the two sets of transformers. The drop in pressure due to inductance was practically nil, the capacity of the line being sufficient to compensate for reactance loss.

Continuing the experiment, part of the Salt Lake City station load was run from Ogden, with current at 24,000 volts. This was supplied to about 500-horse power in synchronous motors and lights for two days, under most severe climatic conditions—rain, fog and snow alternating. In addition a severe thunderstorm prevailed all through the night, the lightning arresters discharging repeatedly. Notwithstanding the severity of the conditions under which the test was made, the motors operated without failure and the lights burned without flickering, even during the times of lightning discharges. Not the slightest difficulty of any kind developed while this experiment lasted.

By the recent accomplishment of a scheme of consolidation all the electrical plants in Salt Lake City, as well as the transmission plants, supplying current from it to the outside, have been merged into the Union Light and Power Co. The companies thus consolidated were the Pioneer Electric Power Co., the Salt Lake and Ogden Gas and Electric Co., the Big Cottonwood Power Co., the Little Cottonwood Power Co., the Citizens' Electric Light Co. and certain smaller interests.

The plant of the Pioneer Electric Power Co. is one of the most important installations in the West, and the transmission one of the longest. The power house is located a short distance from the mouth of the Ogden canyon. The power is derived from the Ogden river, the water being brought to the power house through a wooden stave pipe and riveted steel pipe line, about 32,000 feet long. The electric plant consists of five General Electric three-phase alternators, 24-pole machines running at 300 revolutions, and delivering 750 K. W. each at 2300 volts and 60 cycles. The complete plant is designed for ten units, or a total output of 10,000 H. P. The exciters are G. E. 6-pole 500-volt K. W. dynamos, each of ample capacity to excite ten generators. Each alternator is directly connected to a Knight water-wheel of 1200 H. P. capacity, and each exciter to one of 135 H. P. capacity.

The current is fed into the transmission lines from the step-up transformers at 16,100 volts and delivered to the step-down transformers at 13,800 volts. They are ordinarily connected in delta, but can also be connected in Y to raise the potential to 25,000 volts whenever it is desired to run at the higher potential in order to increase the capacity of the line or the distance over which the power is to be carried. The switchboard panels on the gallery at the end of the power house are for the outgoing feeders and are arranged to handle potentials of 25,000 and 30,000 volts. Everything necessary to control the operation of the electric and hydraulic machinery has been carried to the switchboard panels on the same level as the generators.

Both step-up and step-down transformers are of the air-cooled type and are each of 250 K. W. capacity. The pressure of the current for local distribution to the smaller transformers at Salt Lake City is 23,000 volts.

Pipes for Conveying Compressed Air.

Most of the compressed air plants in mines are inefficiently piped, and no attention whatever is paid to long bends, and the pipes in general appear to be specially installed to exhibit every class and variety of pipe fitting the market affords, and with many duplicates. I have counted five 1-inch elbows in the space of 3 feet, to connect up a pump to the main air pipe, when the price of 1-inch hose and couplings would have been less and the hose would have delivered to the pump nearly the line pressure. The pressure loss in each of the 1-inch elbows would be five-thousandths of the square of the velocity of the air through the pipe. The pump had a 6-inch cylinder and the piston moved 50 feet per minute. The ratio of the cylinder area to the pipe being 1 to 36, the air in the pipe must move 1800 feet per minute, or 30 feet per second. This, squared and multiplied by five one-thousandths makes a loss of 4½ pounds for each elbow, or twenty-two pounds for the five—certainly not a sensible or desirable result; yet one sees it everywhere in the mines. The passion that miners have for 1-inch pipe is marvelous. One may frequently see strings of it, 500 feet long, conveying air. It has cheapness and ease in installment to recommend it, but the wood pile and the owner suffer. A proper plant should have no 1-inch air pipe underground over 10 feet long, and no short elbows.

At some convenient place, where the total length of air conduits from the surface motors shall be a minimum, a good reheater should be established and connected to all these motors. There is ample scope to improve upon the reheaters now upon the market. They may be classed as coil, tube and shell reheaters. The first is a simple coil or nest of coils within a furnace; the tube reheater consists of a nest of pipes screwed into a cast iron head, and all surrounded by a furnace; while the shell reheater is made much like an ordinary domestic sheet iron heater, except that it will sustain pressure, the fire being within it. Any of these will do fairly well, especially if well insulated on the outside to prevent surface radiation.—E. A. Rix, Cassier's Magazine.

Treating Clay Ores.

The following is furnished the Salt Lake, Utah, *Tribune* by Messrs. Weir and Bettles, of Mercur, Utah:

In our method it makes no difference how clayey the ore is, for with the aid of agitation it is first cyanided and no more cyanide is required than in ordinary leaching. From the average ore the values may be obtained from the pan in four hours, and as there are two tons to the pan, twelve tons to the pan can be leached daily. The fine gold having been obtained as a precipitate, amalgamation is then resorted to, and, in the bath of quicksilver which follows, the coarse gold is taken up and the product taken out as an amalgam. There is nothing new about the pan treatment; it is simply in the treatment of the mixture after it has reached the pan, and in the extraction of the metal from the solution.

IN Mexico one cannot take up one or more claims and hold them indefinitely by filing a record of the claims taken, paying a small fee and doing a little mythical work. The claim has to be "denounced" at the mining office of the district, which requires a fee, surveyed by an engineer, who charges likewise a fee, and when his survey is accepted and title granted the claimant has to pay $10 for every "pertenencia" of ground (a pertenencia is an area measuring 100 meters on each side). This payment of $10 per pertenencia has to be made annually thereafter or the claim is forfeited. The placers are mostly hydraulicking or sluicing propositions, in which large bodies of gold-bearing earth have to be moved by the force of heavy volumes of water, to develop, conduct and handle which need the co-operation of associated capital. It takes money to sluice or hydraulic away a bank of earth 20 to 40 feet in depth to get at the gold on the bedrock. Such expenses go far to make it hard for a poor man to embark in placer mining in Mexico; and those who think that with their prospecting pan or rocker, with a few weeks' supply of provisions, they can wash out fortunes are doomed to disappointment. Men with means who can embark in large projects can find opportunities for investment in the Yaqui gold fields and elsewhere; but others will be disappointed.

IN answer to a query concerning the duty on manganese ores, the Treasury Department at Washington says all imported manganese ores and oxides contain a small percentage of metallic iron, and ores containing less than 10 per cent of iron and from 40 to 50 per cent of manganese, or over, are commercially known as manganese ores, valuable only for the manganese contained therein, and have been admitted to entry free of duty as such for the past twenty-nine years, under decisions of the Treasury Department, the original decision being dated July 15, 1879.

Holding Power of Wire and Cut Nails.

Before the Technical Society of the Pacific Coast in San Francisco, Prof. Soule of the University of California recently read a paper on the holding power of nails from data obtained by tests with wire and cut nails, driven in Douglas spruce (Oregon pine) and in redwood.

The points which it was particularly desired to clear up by these tests were:

The relative merits of cut and of wire nails; the merits of different surfaces on the nails; the best shape of nails, as to points, etc.; the relative holding powers of these nails in Douglas spruce and in redwood; the best relation between the length of nail and the thickness of the board nailed by it; the effect of time upon the holding power of nails in the cases of the kinds of timber above named.

The conclusions formed from a consideration of the results of the tests are as given below:

1. Cut nails, for the same area, hold better than wire nails.

2. The holding strength increases with the length of the nail, but not according to any simple law.

3. The pointing of the wire nail adds about 100 per cent to its efficiency. If slightly more pointed than they are made at present, the holding power would be increased.

4. Pointing the cut nail adds 33 per cent to its efficiency, but it increases the tendency to split the wood. To avoid splitting, the taper side only of the cut nail might be wedged. If wedged on all four sides it holds best.

5. Cut nails driven with wedge across the grain are only about 80 per cent as strong as those driven with the wedge parallel to the grain. This fact does not accord with practice in driving, probably on account of the greater tendency to split the wood.

6. A nail is three times as strong when driven into the side of a beam—that is, across the grain—as it is driven into the end of it—that is, parallel to the grain.

7. The holding power of nails increases with time in the case of redwood. It is asserted by some that the tannic acid rusts the nail and thus increases its holding power. It is probable that this effect would be extended over a few months only, after which the further rusting of the nail would weaken it. The effect of time in the case of cement nails does not seem to be great, and is only slightly greater in the case of wire nails, but is very considerable for cut nails.

8. The tests show that all these nails lose holding power with time when driven into Douglas spruce. This probably may be accounted for by the small lateral adhesion of the fibers in that wood and their gradual yielding to the wedge action of the nail. In other words, they pinch the nail less with time, but it seems unlikely that this diminution would continue indefinitely.

9. In redwood a cut nail holds slightly better than a wire nail.

10. In Douglas spruce, the cement nails are 1.3 times stronger than the wire nails.

11. A cement nail is slightly stronger than a wire nail when driven into redwood, but the difference in strength is small.

12. Under shearing stress cut nails are 1.4 times stronger than wire nails. There seems to be no difference in the resistance of the nails to shear in using blocks of Douglas spruce or of redwood.

13. When nailing cleats to a block the same area of nail in the wood will hold about the same stress, whether a few large nails are used or more small ones. The superiority, if any, is in favor of the larger nail.

14. The cut nail holds 1.33 better in Douglas spruce than in redwood; the wire nail about the same in each, with a slight superiority in favor of redwood.

15. The holding power of a nail is not directly proportional to its surface in contact with the wood. In determining the relative holding powers, the stress per unit area has been employed, but as far as possible nails have been taken as nearly alike as practicable, so as to eliminate the error introduced by this method.

16. In drawing a nail, the pull seems to reach a maximum shortly after the nail starts.

17. In the case of a wire nail, the applied stress increases gradually; of a cut nail, by jerks and starts. The decrease of holding in wire nails after reaching the maximum is gradual, while in cut nails it falls off suddenly. Hence, a cut nail is not as efficient in holding together pieces of timber subject to vibration as is the wire nail, for the former is more easily loosened, and, being partly withdrawn, looses much of its strength. This results from the fact that the major portion of the resistance comes from the wedge sides of the nail.

18. Cut nails are more likely to split Douglas spruce, and wire nails to split redwood.

19. In shearing a cleat from a block to which it is nailed, a maximum resistance is obtained for a cleat the thickness of which is two-fifths of the length of the nail used. This agrees closely with the practice of using a nail about 2½ times the thickness of the thinner piece nailed.

20. A slight roughness on the surfaces of a nail is of advantage.

21. The cut nail is more efficient when driven into Douglas spruce, but the wire nail is more so in redwood. This fact bears out the theory as to the manner in which a wire nail holds. The lateral pressure of the redwood fibers is greater than that of the fibers of Douglas spruce, on account of the closeness of the grain of the redwood, it having thirty-six annular rings to the inch, as against fourteen for the spruce; and this holds true notwithstanding that the redwood is softer than the spruce.

The general conclusion from the tests was that, for most uses and under most conditions, the cut nail is superior to the wire nail.

PROF. IHLSENG of State College, Pa., recently lectured in Boston on "Mine Gases." His explanation of the difference between anthracite and bituminous coal, so far as the gases are concerned, is based on the statement that all coal beds are supposed to have been originally formed on a horizontal or flat bed. The anthracite beds were placed under enormous pressure—or side pressure, to be more exact—by the contraction of the crust of the earth during the cooling stage, thus forming the coal basins as we have them at the foot of the mountains. This enormous pressure resulted in forcing the explosive and other gases out of the anthracite beds to the seams and crevices of the veins and to the fissures, seams and pores of the rock strata. This compression has been so great that gases in the anthracite region are sometimes found with the mighty pressure of 17,000 pounds to the square inch. These facts furnish some idea of the dangers from gases which are met in the mining of anthracite coal, and the professor drew vivid pictures of the power of gas kept under such a heavy pressure. On the other hand, the bituminous beds have not been subjected to such a disturbance and pressure, and the coal, therefore, retains the gases which it contained originally. He showed by experiments and otherwise that all gases burn with a blue flame, and described the effect of the various gases on man. White damp, he showed, is produced by imperfect combustion. Black damp is produced by perfect combustion, and destroys life by reason of being devoid of sustaining elements. Sulphuretted hydrogen, or "stink damp," he said, is a source of danger not commonly acknowledged.

THE prices at which coke is quoted in the different countries are given as $1.44 in the United States, $3.18 in Great Britain, $3.24 in France, $3.36 in Germany, $3.48 in Belgium, and in Spain $5.08. These figures are based on the quantity of coke used in the manufacture of a ton of bessemer pig iron.

Obituary.

MELVILLE ATTWOOD, the well-known mining engineer, died at his residence in Berkeley, Cal., last Saturday. Deceased was in his 87th year. He was born in Worcestershire, England, in 1812. Travel and research gave him a place among scientists half a century ago.

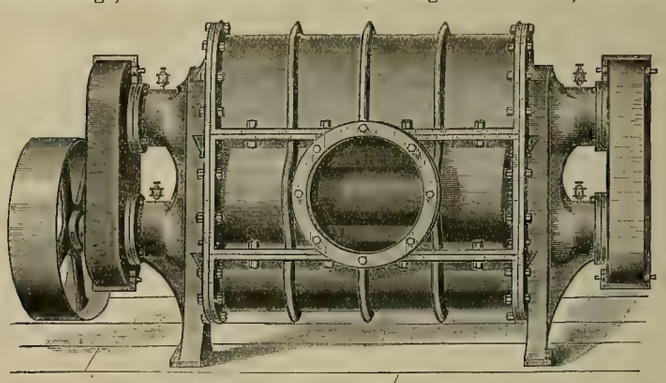


THE LATE MELVILLE ATTWOOD.

In 1843 he secured from the British government patent for a process that gave zinc ore commercial value. In '52 he was looked upon as foremost in metallurgy. In that year he came to California, built one of Grass Valley's pioneer stamp mills and introduced sundry innovations therein. At the time of the Washoe excitement he assayed the Comstock ore, and on his report much of its early fame was founded. His services were constantly in requisition and he was well known all over the coast. He was one of the earliest contributors to the MINING AND SCIENTIFIC PRESS and much of his best thought and experience are contained in its files. His efforts have greatly advanced the mining industry, and in all scientific and technical matters he was long recognized as authority. Personally he was one of the most genial of men, and to the close of a long and useful life he kept up an active interest in all things pertaining to his chosen profession in which he was at all times enthusiastic. He was a member of many scientific bodies, and the presence at the funeral of many members of various technical societies testified to the respect in which his memory was held by many of his old time associates.

Standard Green Blower.

The accompanying cut shows a standard Green blower with discharge outlet on either side. The large size blowers are arranged with detachable journal bearings, the medium and small size blowers have the journal bearings cast as a part of the head plate.



STANDARD GREEN BLOWER.

Its working parts consist of two impellers, each a single casting fastened to a steel shaft extending the full length of the machine, flattened where it passes through the body of the impeller, each bearing bushed with phosphor bronze. The blower is geared at both ends and enclosed in an oil-tight cover.

The makers say: "In designing this blower our endeavor has been to produce a machine which will occupy the least space, displace the largest volume for the space occupied, exhaust and deliver in a practically even volume, have the least weight combined with ample strength, be entirely void of complications, complicated shapes, sliding parts or sliding motion, the least liability to get out of order, the least weight to revolve, be entirely free of internal friction in case of wear of the journals, and do the work with the minimum power."

The above blower is supplied by Fraser & Chalmers, Chicago, Ill.

THE Denver *Mining Industry and Review* notes a new stamp mill, brought out by W. H. Lloyd of Colorado Springs, Colo., in which the stamp differs from the ordinary horizontal drop action, in that it has a backward and forward motion, the stamp, after dropping, sliding over the bed either backwards or forwards, and bringing the rock between it and the bed.

The London Mine Promoter.

NUMBER II.—CONCLUDED.

The anxious time now is the responses—the coming in of the subscriptions by the date named, when the subscriptions will close—it being always stated that the owner of the property reserves all but the few thousand shares, generously offered the public as a great favor, for his property, not caring to sell more. The offering is usually very moderate—a matter of 20,000 shares, say, out of the one hundred or two hundred thousand of the capitalization.

Inasmuch as the promoters and brokers depend upon the amount received for subscriptions to raise the cash to pay the owner, the amount he is to receive, and the expense of registering, printing, postage, etc., every effort is made to get off the utmost possible number of shares. Usually the broker, under an agreement that he is to have the sale and handling of all the issue of shares for the whole operation generally takes the risk of the expense for issuing the circulars, which is no inconsiderable amount, the postage alone often being, with expense of addressing, as much as £100. Then the newspaper advertising, for none must be omitted under the penalty of being jumped on and insinuations that the enterprise is a fraud, etc., all runs up into the thousands. So putting a mine or other enterprise on the London market is no joke, and involves no little risk and loss, in case the subscriptions fall short of covering the promised price to be paid for the property and all expenses. The law requiring a certain proportion of the issue to be subscribed for makes any subscriber responsible, once the total subscriptions justify going to allotment, as is termed, *i. e.*, when money enough has been received to cover the items named. If a failure to do that, the whole scheme is a grand smash-up; the promoters lose the outlay and get unmercifully chaffed and ridiculed, amid much rejoicing by rivals in the business.

As the owner of the property depends usually on the success of the putting out of the enterprise, he has really furnished the promoters with the means of making a large profit. They have made use of him and his property—made him the cat's-paw to rake the chestnuts out of the fire.

It matters very little what his contracts are. They may call for a cash payment in any event; but unless the scheme is a success, he never gets a cent. All the satisfaction he gets is being told to sue if he likes. They know that he, being a non-resident, will be called upon to furnish heavy bonds for possible costs, etc., heavy lawyer's fees, etc., and they can stave off until in disgust he abandons the suit and goes home. The coolness with which the general class of promoter will meet a demand on him for money he *has signed an agreement to pay* is one of the most pronounced cases of barefaced cheek our American friend has probably ever experienced. Such instances are by no means rare where Americans are the plaintiffs. It is needless to say they would not dare repudiate obligations of the kind or those involving their credit among the people they do business with at home in their own community; but it does not seem to impair a London promoter's credit or standing in case the victimized is an American. On the contrary, it is considered rather a smart thing to "do" the Yankee.

Should the launching of an enterprise be successful, *i. e.*, money enough be obtained from the public to cover the requirements, then things go on swimmingly, the owner of the property gets an installment, and, as the issue of such a large capitalization in shares gives them, goes on the Board, the promoters and broker continue to peddle out shares as long as the public will take them and rake in a handsome profit. Meantime, a great show is made of going earnestly to work on the property. If it is a developed and working mine, immediately all practical American miners and local officers are displaced, and relatives of the directors are sent out to fill numerous created offices—a superintendent who has never seen an American mine, at a high salary, a very important part of whose duty it is to boom the mine by encouraging telegraphs and weekly reports, and thereby keep up the price of the shares, and, if possible, to "boost" them to a premium. The mine may be a good one and a paying property, but hampered, as it is, with extravagance at the mine with a half dozen supernumeraries drawing big salaries. With the salaries of the Board in London, office rent and another set of "clarks" and flunkies to pay, it is not strange that dividends are few and far between, and the bright hopes of subscribers are dashed to the ground; the promoters, broker and directors, having gotten rid of their stock, have no longer any interest in supporting it. It naturally goes down, and when the mine can no longer pay its salaries to directors, they gradually drop out and leave their mantles to fall upon irresponsible shoulders. Or, in case public attention is called to the condition of things, a meeting is held and energetic resolutions passed, and a great show of retrenchment made to mollify impertinent shareholders who are troublesome and persist in wanting to know, you know.

The prospectus of a mine put forth on the launching is one of most extravagant promises, and reads like a romance, written to attract the attention of the credulous, widows, butlers and servants, who are the usual dupes, and from whom the bulk of the subscriptions come; the high-sounding names of the directors that have been secured by promises of free shares and fat salaries inspiring confidence.

The English laws are very strict in the matter of responsibility of directors, who have in instances of gross frauds been made to suffer severely, and it is becoming more difficult to secure directors with high-sounding names as a guarantee of the merits of the mine or scheme advocated. When a mine is "launched" and put upon the market as a preliminary step, it must be registered at the "Somerset House," and a full description given of its location, what property goes with the sale, price paid, conditions, etc., names of directors and all parties concerned in the purchase. The expense of this registering is considerable, something near £500. This, together with the printing and mailing of the cartloads of voluminous circulars sent to every city, town and hamlet of the kingdom, as well as the publishing of the prospectus in all the newspapers, runs up the usual cost of launching the scheme to something near £6000—a serious item, which is usually a divided risk between the promoters and brokers who are to have the exclusive manipulation of the shares.

TALC is extracted on a large scale from the granite mountain of St. Barthelemy, in the French Department of Arriege, about twenty miles from the main chain of the Pyrenees. The principal quarry at Tremouin is worked in three banks or terraces, each about 49 feet high. The best rock is of a bright white tint, and feels greasy to the touch when reduced to powder. The quarried rock is brought by a tramway to the end of the quarry in the Axiat valley, and then by wagons eleven miles to Luzenac, where water power is taken from the Arriege river. The mechanical preparation consists of drying in a rotary oven, breaking up small, grinding and sifting, the grinding being effected in mills with steel balls. The larger portion of the product is converted into powder, only a small portion being sent away in a rough state, or cut into pencils for writing on metals. Besides its use in soap and paper making, talc enters into the composition of axle grease, while it also serves as an insulator of the greatest value in the construction of electrical instruments.

THE earth is a result of an explosion that occurred upon the sun, some scientists estimate 30,000,000 of years ago. When this explosion occurred the sun was most likely in a gaseous state and the violence was sufficient to throw the earth far enough away to come within the range of gravital attraction of other planets, consequently what is now the earth did not fall back into the sun from which it had been thrown. Other planets have been caused the same way and from the same source—for instance, the moon and Mars. If a ball should be shot out of a cannon with sufficient force to land it upon Mars, if the inhabitants of that place should use the same word in naming it as we do they would call it "meteorite." If, however, the ball should only have sufficient velocity to carry it say half way to Mars, it would then come to a stop at a point where it would be acted upon by the attraction of all surrounding planets, consequently it would fall upon neither, but would immediately take on a motion or orbit of its own, when it would become a true planet, just as our earth is.—Dictator.

Test for Gold and Silver.

To test a piece of quartz for the presence of both gold and silver, says H. J. McCourt, it will first be necessary to reduce the ore to a powder sufficiently fine to pass through a No. 60 sieve. Place this pulp, when screened, in some flat iron vessel over the fire, so as to burn out those elements that readily sublime or burn. The pulp, when cool, should be placed in some glass vessel and covered with nitric acid, pure or slightly diluted with water. To facilitate the action of the acid, the vessel containing the acid and pulp should be set in a pan partially filled with sand; then heat the pan; the sand will prevent the glass vessel from bursting by rapid expansion. As soon as the acid begins to boil, set it off the fire and let remain standing for several hours. Add about as much again water as there is acid and pulp, then shake or stir thoroughly and filter off the liquid. The liquid thus obtained is a solution of the nitrates of all the metals that the rock contained and that are soluble in nitric acid. Add drop by drop a strong solution of common salt. If a white precipitate appears after adding the salt, it is either oxychloride of bismuth, mercurous chloride (calomel, a salt of quicksilver), or chloride of silver.

To tell to which of these three classes the salt belongs, pour off the fluid above; to the precipitate add muriatic acid; if it dissolves it is bismuth, and neither silver nor quicksilver. If it does not dissolve, pour off the acid, and to the precipitate add strong ammonia. If the precipitate dissolves the salt, it is silver chloride. If it does not dissolve, it is quicksilver chloride or calomel. To the dried silver chloride add an equal amount of washing soda or borax, then it can be melted to a silver "button" of bullion.

As to the gold: take the pulp and filter saved from the first part of the experiment and put into a crucible and heat. The filter will completely burn; next put the pulp through a very fine screen. Now soak for two days in an acid consisting of a mixture of four parts nitric and fifteen parts muriatic acid, which has been prepared at least two weeks before. This will convert any gold present into a perchloride of gold. Platinum will also be converted into a perchloride. Again filter; take the liquid that filters through and evaporate to dryness, either in a porcelain dish or glass flask in the sand, as before described. This is done to remove the acid. Dissolve the dry residue in water, simply by adding warm water to the flask as soon as it is sufficiently cool not to burst when adding the water. When the salt which remained in the flask after evaporating is thoroughly dissolved again, add a solution of ferrous sulphate (copperas) or of oxalic acid and set aside. Let stand for two or three days.

A fine brown powder precipitated to the bottom of the flask is pure powdered gold. Pour off the liquid above the powder; wash thoroughly and dry. These precipitates may be melted into a gold button, but it requires great heat.

The Engineering Chemistry of Boiler Water.

At a meeting of the Engineers' Club of Philadelphia on the 2nd inst., H. Leffman presented a paper on the above subject. He stated that when the applicability of a water to steam making purposes is to be determined the dissolving gases become important, while the organic matter may be neglected, unless it is unusually large in amount or exceptional in character. Surface water is well adapted for boiler purposes, except for its liability to turbidity. Subsoil water, or that obtainable from springs and ordinary wells, is usually clear, and contains notable amounts of solid matter. Deep water is very variable in character, even within a limited area. It is often rich dissolved solids, iron compounds, and sodium chloride. The suitability of water for boiler puposes must be considered with reference to the two properties of corroding and scale forming, which are to some extent antagonistic, since the deposit of material on the iron will, of course, protect it. In general, it may be said that the corrosive qualities are due to the oxygen and carbonic acid present in solution, and more rarely to organic or mineral acids, which are highly objectionable.

The scale forming ingredients in water are principally the compounds of calcium and magnesium in the form of sulphates, carbonates, and chlorides, and the amount and character of the scale will depend largely upon the form of combination. In the ordinary use of water the removal of the carbonic acid is brought about by the heating; deposits in carbonates promptly take place to the amount which is independent of the concentration of the water by the conversion of a portion of it into steam. Calcium sulphate is one of the most objectionable ingredients in boiler water. It is soluble in cold water to the extent of over 100 grains to the gallon, and becomes less soluble as the temperature rises, until at about 300° Fahr., which nearly corresponds to sixty pounds pressure, it is almost insoluble. Although the various materials which deposit in boilers are often collectively designated as "scale forming," yet there is a great difference in the character of the deposit. The carbonates produce soft scale, calcium sulphate a hard scale.

As engineers cannot control the laws of nature, and often have no choice of water, an important question is, What may be done to remedy the objectionable conditions? Turbidity may be easily remedied by filtration, but if filters using alum are applied, care should be taken not to use an excess of it, as decided corrosion might be produced, or hard scale. When corrosion is due to free acid, it may be easily overcome by the use of alkaline substances, among which caustic soda and soda ash would be most generally applicable. The corrosion due to dissolved oxygen will be materially reduced by heating the feed water, and also by arrangements for not allowing the water to come directly in contact with a highly heated spot. The prevention of scale is secured in various ways. The magnesium and calcium carbonates that may be held in solution by carbonic acid are all precipitated by the removal or neutralization of that acid. The former may be accomplished by the heating of the water, and the latter by the addition of some basic substance, such as slaked lime or caustic acid. Calcium sulphate being a most objectionable ingredient, much attention has been given to the methods of preventing it from forming hard scale. At the present day the tendency is to the use of direct precipitating agents, among which may be mentioned trisodium phosphate and sodium fluoride. Both these substances convert all calcium and magnesium compounds into insoluble flocculent precipitates, yielding also highly soluble and non-corrosive sodium salts. They seem to meet the practical issues very well, and are in extensive use.

Mining Summary.

CALIFORNIA.

Amador.

Ledger: The Oneida crosscut at the 150 level encountered the ledge at a distance of 255 feet from the shaft. The ledge is about 2½ feet thick and some parts of it are very good, showing free gold and an abundance of sulphurets. Mgr. Truscott is running drifts north and south in the ledge. In the crosscut in greenstone and hard, gray slate about 260 feet was made in one month. Three shifts of four men each did the work with two power drills.——The Wildman Co. have decided to push the new Emerson shaft, to erect an additional forty stamps on the Mahoney property, and put in a new compressor. Supt. J. Ross Jr. has already in hand the erection of the new stamps and other machinery.——Devlin, Marsh & Davis have five stamps of their 10-stamp mill running and are saving their sulphurets. The ledge shows a good percentage of gold and is free milling.——Two water hoists are to be erected on the Satellite copper mine near Campo Seco this summer, in time to commence work with the first water that comes down the Campo Seco canal. When the hoists are up shafts will be sunk 1000 feet.

Butte.

Mercury: D. M. De Long and H. J. Raisch, of San Francisco, are about to inaugurate operations on a large scale on North Fork. Having secured eight miles of the river bed, their purpose is to place a steam derrick to handle the boulders though mining operations are not expected to be under full head way until next season.

Calaveras.

The Utica Co.'s proposition to the people of Angels Camp to explore under the various lots of town at a depth of 500 feet for new veins is meeting with encouragement on the part of the citizens.——Work has started on the Wiggin mine, near Mokelumne Hill.——Sterling Bros. at West Point made a shipment of sulphurets that netted them $167 per ton.——Gouldson & Allen have reached 70 feet on their new shaft and have a vein that yields a fair prospect.

J. P. Cobb has bonded the Golden Bell mine near Murphys for $10,000.

El Dorado.

(Special Correspondence).—By the persistent efforts of a few enterprising men, El Dorado county's merits as a mining section are gradually brought to the attention of outside capital, of which there is a lack in our midst.

The sale of the Gold Note and Philadelphia mines was closed in San Francisco yesterday, E. W. Chapman being the purchaser for $55,000 cash. The property comprises five claims. It was first brought prominently into notice through a report by R. S. Raw in 1892, who has since superintended most of the development of the property. New York capital was interested for a time, but faith weakened at the required output of money. After a long idleness the Septimus Development Co., San Francisco and Sacramento capital, continued the work, again under the superintendency of R. S. Raw, who organized the company. The work as agreed upon with the owners for a certain interest was completed, but negotiations failed of further arrangements and work again ceased. Senator Chapman, who had visited the property, has been negotiating for it for many months, and finally brought order out of chaos in the conflicting interests. The mine has a shaft following the vein 350 feet, which at the bottom is from 5 to 10 feet wide, 5 feet of it being solid ore, mill tests yielding from $10 to $70 per ton. Sulphurets run 10 per cent and assay $380 per ton. There are in addition 160 acres patented land, sawmill, water and steam power, and timber in abundance. The property is twenty-seven miles east of Placerville. Mr. Chapman will resume work immediately and on a large scale.

Placerville, April 26th, '98.

G. W. Kimble has begun work on the Green Mountain mine and has let a contract for sinking a shaft.——The Two Channel gravel mine, near Georgetown, is employing fifteen men. Shortage of water in that section is anticipated.——The *Nugget* says that a 40-stamp mill is talked of for the Griffith Con. mine at Diamond Springs.

Fresno.

W. J. Prettyman is developing an iron property near Porterville. The ore carries some gold.

Kern.

Miner: G. M. Rose, near Randsburg, had ten tons of ore from the May Queen run at the Eureka mill, which turned out about $90 per ton.——Men are working on the Blackhawk, taking out ore. A mill run will be made soon.——C. A. Burcham is working the O. K. mine with ten men and has a ledge 3½ feet thick. The ore is estimated from $40 to $100 per ton.——Leasers are shipping thirty tons ore from the Sister mine to the mill at Cuddyback lake. They are sinking a 200-foot shaft. It will run from $15 to $18 per ton.

Los Angeles.

F. C. Carmicle, near Acton, has taken out about five tons of ore to be tested by the cyanide process at Kane Springs.

Mono.

Three of the cyanide plants at Bodie have started up, and the other three will be in operation again in a few days.——Reading & Maher are putting up a dry washer on the Gold Bank claim.

The report for the week ending April 16 at the Standard Con. M. Co.'s mine and mill near Bodie shows 108 men employed; tons of ore extracted and treated, 282; tons of custom ore extracted, 11; tonnage from stopes, 207; from development work, 75; average daily crushing, 416-7; average concentrates produced, 2%; drifts driven, 67 feet; feet of raises driven, 39; value per ton of concentrates, $111 23.

Nevada.

Telegram: Vincent & Eddy are unwatering the Good Hope mine, near Grass Valley, preparatory to inspection for purchase. The ledge in this property is from 14 to 16 inches wide and the ore will average $50 per ton. The Old Home Con. Co. at Blue Tent have begun sinking and have placed a hoist in the tunnel 700 feet from the mouth.

Placer.

An active and profitable season is expected in river mining of the North Fork of the American river and its branches near Auburn. Near Alta, work on the Gold Standard is being pushed rapidly. The mine is owned by Jones & McKim. The tunnel being run is too high, and as soon as the ground is satisfactorily prospected a new tunnel will be run low enough to tap the bottom of the channel. If this mine opens satisfactorily there will be other mines opened in the same vicinity.——W. Nicholason is working steadily at his quartz ledge near Towle.

Herald: A force of men is at work at the Cash Rock near Forest Hill, putting things in shape for the season's run.——Supt. Roumage has twenty-five men at work at Horseshoe Bar and will soon be ready to start the hydraulic elevator.——A good sized ledge of ribbon rock has been struck at the Maus mine.——The Big Chawk tunnel is being driven ahead rapidly. This mine is being worked under bond by Senator Chapman.——A large force is at work on the Spanish quartz mine and will soon have the mill in running order.——Supt. Chappellet is still driving the Eureka tunnel ahead at the rate of 50 feet a week. He expects to start the upraise by the middle of May.——The Mayflower people are taking out pay gravel and have increased their working force during the past week.——T. Wolford, Supt. Black Canyon mine, will resume work on that property.——Considerable development work is being done on the Ralston Ridge. A contract is about to be let for 250 feet of bedrock tunnel with the privilege of taking 250 feet more.——Work has been resumed on the Buckeye tunnel. Mr. Blackledge is Supt. The contract for sinking 50 feet on the Providential quartz ledge was completed and a contract for sinking 50 feet deeper will be let.

Sentinel: Sinking is in progress at the new shaft of the Bellevue quartz mine near Ophir, which is down 130 feet. Power for pumping and hoisting is secured from an overshot wheel driven by 30 inches of water. With three 8-hour shifts, quartz has been taken out during the past five weeks which returned nearly $6000. The ore was crushed in the Pioneer mill at Ophir. But little drifting and stoping has been done. The width of the ledge varies from 1½ to 2 feet. The Bullion quartz mine, the first extension of the Bellevue, east, has been bonded by this company. The ore in the shaft is excellent, and the company is contemplating the erection of a 5-stamp mill within the next ninety days. Perry & Holland, who have been developing the Evening Star quartz mine, near Auburn, have recently taken out over $3000 worth of specimen gold quartz. The Pioneer G. M. Co. have over fifty men on the payroll at their quartz mine near Towle. Work has been commenced on the new dam, where the company will develop 150 H. P.

Plumas.

Bulletin: J. A. Smith has purchased the mine and water right owned by W. B. Morton, near Quincy. In addition to working the Morton property, Mr. Smith will utilize the water right in operating another mine, near Lone Rock. He will make two miles of ditch and begin hydraulicking. During past seasons the returns secured from it have been satisfactory. Last season, with the limited head of water at command, he realized $15 a day while working.——Near the Morton Cooksey & Walker are opening a small hydraulic claim, which is prospecting well.

Riverside.

At J. Knowley's mine, near Perris, the shaft is down 50 feet and a gold-bearing ledge over 2 feet thick has been struck that averages $15 per ton.——Bates & Langford are putting their tailings at the old Hoag mine through the cyanide plant a second time. They secured 1000 ounces of fine gold, and the prospects are good for getting half as much more.

San Bernardino.

J. Goulding, near Box Springs station, made a strike in his mine of ore assaying from $100 per ton up to $700. Goulding has taken out about fifty sacks of ore, which is high grade.

San Diego.

(Special Correspondence).—The owner of the King mine in the Julian district will begin work immediately on that mine and also upon the Cincinnati Belle, near Banner. The King has long been idle.——The Helvetia mine is to be unwatered by the 20th to admit of examination.——The Kentuck is reported sold to a New York company. A local company will develop and operate the property, in the interest of the New York purchasers.——The Ready Relief and the Antelope mines, near Banner, are actively prosecuting development work and at the same time raising some good ore.

Julian, April 22nd, '98.

Work has been resumed on the Elevada mine at Banner. The 300 tons of ore on the dump will average $30 per ton.——On the Ranchita mine a new vein has been found with 100 feet of ore in sight, while on the old ledge there is still 40 feet in sight.——On the North Star the shaft is all in ore to the 200 level, the depth of the shaft; it will average $40 per ton.——The tailings at the Owens mine are being worked by a cyanide process.——Ore from the San Diego mine, near Julian, to the amount of several hundred tons is being crushed at the Owens mill. The Pierce Bros. are operating an arrastra with good returns.

Shasta.

At the first general annual meeting of the Mountain Copper Co. in London on the 2nd inst. Mr. Keswick, the chairman, said: We are now proceeding entirely satisfactorily with extraction from the mine, and with calcination, smelting and the refining processes with every indication of continuous and smooth working. In the calcination process we are hopeful there may be a still further improvement possible by the introduction of mechanical automatic plant, and to this end experiments are being made which give promise of success. Railway working has been perfectly satisfactory, the line meeting the requirements of traffic with ease and economy. * * * The body of ore from which we are at present drawing supplies is the only one which has thus far been defined with fair accuracy, and in it we have in sight 1,500,000 tons of ore; but in addition to this quantity there is the ore below our present lowest level, the very large mass of ore we know exists at the north end of our property (the quality of which has still to be ascertained), and the other masses we hope and expect to develop under the strong outcrop which for more than four-fifths of its length has not yet been touched. To the prospecting of these masses attention will this year be given as we have opportunities, and as much information regarding quantity and quality obtained as a moderate outlay will procure. The quartz supplies for fluxing our own ores have been chiefly derived from neighboring mines, and their owners received from us every inducement to work them on a larger scale. We have no scarcity of flux, but its richness in gold has not been as satisfactory to us, or to the mine owners, as could have been wished. The precious metals obtained in the past year from the ores treated amounted to 195,000 ounces of silver and 8200 ounces of gold. This gold was slightly in excess, while the silver fell somewhat below the quantity anticipated.

Searchlight: There are ten men working at the Mt. Shasta mine, near Shasta. The old shaft is being drained, and drifting is in progress; paying ore is being shipped to the Keswick smelters. Next year the owners contemplate placing electric plants on the property and sinking 1000 feet. R. K. Howk is Supt.——The Red Hill mine, near Ono, has been in operation for seven years. The poor season has made itself felt to the company. The past winter's work has produced encouraging results. Work for the season will cease next week.——Operations opened a 50-foot bank, with a face of 400 feet, said to average 33 cents per cubic yard. Two days' run yielded $90. M. Gardiner, the owner, contemplates putting in machinery to pump water to a sufficient elevation for effective work.——The California Savings and Loan Society sold to L. Lewisohn, 83 Fulton St., New York City, a number of mining claims, near Redding, for $7700. C. W. Cockerill sold a number of claims to the same party for $20,000. The C. P. Ry. Co. sold to J. Parke Channing of New York mining claims for $1400. The properties were examined by Mr. Channing and F. R. Mills, Supt. Merced G. M. Co., Coulterville, Cal. It is understood that a large smelting company will operate the property.

Sierra.

The Happy Hollow mine, near Portwine, has started work.——Near Slate Creek House, Wilson Bros. and Willow have begun prospecting the old Mexican ledge.——The Los Angeles Co. that bonded the Kenton mine, near Alleghany, are driving a tunnel and building a road to haul in machinery. This mine has not been worked for over twelve years. T. R. Garnier is Supt.

Siskiyou.

Journal: The company bonding the Yreka creek property has completed the deal, and will soon place machinery on the ground for prospecting. Holes of 6 inches will be bored to bedrock at a distance of each 200 feet along the ground from Hawkinsville up to the Yreka end of the McNulty place. If satisfied with the prospects, a dredging outfit will be secured of 100 H. P.——The river miners on the Klamath are all at work putting in wing dams, and some are hoisting. The Quinne & McConnell claim force commenced hoisting last week and the Pacific mine at Humbug will commence hoisting within a week. The Benz bar claim at Honolulu will soon have a new wing dam completed, also the Phil Mott claim, while the Vesey creek claim is hoisting pay gravel.——The Gold Ball mine at Salmon river is running steadily.——The river miners at Oak bar and Hamburg bar will have a good season. The river will be lower than ever before known.——The miners at Callahans and south fork of Scott river will do a good deal of mining the coming summer and will have a good supply of water.——The new steam pump is in position at the bottom of shaft No. 3 at the Greenhorn blue gravel mine and will soon be in operation.

News: The King Solomon mine is employing thirty men in the diggings beside the crews working in the woods.——S. J. Fore is operating his hydraulic mine at Callahans.——The Benz Bar claim, at Honolulu, has a new wing dam completed.——R. L. Fagundes, of Sawyers Bar, has struck a good lead in the Hibernia mine.——Ore from the Live Yankee mine, near Sawyers Bar, is being crushed at the Fagundes mill.——The new wing dam at the Phil Mott claim on the Klamath river is nearing completion.——E. F. Mathewson is working eighteen men at Swiss Bar and intends to employ six more.——Reeder & Brown at their mine in Fool's Paradise, at the end of the 30-foot drift struck a 12-inch ledge, some of the ore going several dollars per pound. So far several tubs have been taken out of rich ore. One piece of ore is 12x12x4 inches in size and through the center is a layer of gold 12x12x1 inch. This is the same property from which $6000 was taken in three months, about four years ago, the crushing being done in a hand mortar. At that time the vein was only 1 inch in width.

Tuolumne.

(Special Correspondence).—The activity presented in this county in the development of mining properties and the operation of existing mines is indicative of great promise in the output of gold from this section of the mother lode. It is carefully estimated that there are in and about Sonora between 5000 to 6000 men engaged in prospecting and active mining.

Eastward from Sonora between the Stanislaus and Tuolumne rivers are some of the notable mines of the county, prominent among these being the Alameda, Rawhide, Trio, Dutch, App, Santa Isabel, Golden Rule, Jumper, Eagle-Shawmut, Republican and Harriman.

Among the new developments which is rapidly taking rank is the Bell mine, near Tuttletown, owned by a few San Francisco capitalists. The property has no stock to sell nor is it being developed for market and hence I am pleased to state that unusual as it may seem for a California company, there was every opportunity afforded the writer to gather valuable information concerning this mine. The owners have faith in California's paramount industry in the mining field, and they show an inclination to further and encourage a legitimate enterprise. Were it otherwise my statements would seem a desire to "boom" a property. I have the authority of a prominent and successful mining man operating in this section who has inspected the mine that the Bell will be among the greatest mines of California. Work was begun upon this property under the superintendency of Geo. Blake, who is also part owner, about eight months ago. Work has been crowded day and night. The shaft has reached 400 feet. Crosscuts were made at the 200 and 300 levels. At 400 drifting has been started. From the 300 down the shaft is in the pay chute all the way. The vein is 62 feet wide. The lowest assay made yielded $2.25; the highest was $157. It is carefully estimated that the entire vein will plate $8. The sulphurets run about 2½ per cent and yield $127 per ton, growing heavier with depth.

The owners calculate putting in a mill about June of 100 stamps; the power will be electricity, which it is expected can be installed about Aug. 1st.

Sonora, April 25th, '98.

Democrat: The vein opened by a crosscut tunnel in the Hope mine is 38 inches. The ore is high grade. The crosscut tunnel is 202 feet. Drifting will be started on the vein both ways, and at the same time the tunnel will be driven to a shaft 50 feet for the purpose of securing air. At 70 feet from the mouth of the tunnel the west vein was cut, 2 feet wide and highly sulphureted. After the ore body in sight in the big ledge has been opened, attention will be given to this point as well, and it is known that the quartz there is worth $40 per ton from wall to wall. The Hope has been a combination milling and pocket proposition, and has yielded from $100,000 to twice that amount in pockets alone.——The vein on the Mignonette averages 1 foot in width, with a pay streak 10 inches wide that has been traced 800 feet. It is free milling, the percentage of sulphurets being so small that concentrates will not be considered. The mine was worked years ago and paid. A drift was run 200 feet, but, as the pay chute was lost, it was abandoned. This chute has been picked up again. Various assays show the quartz to be worth $20 per ton clear across.——Operations have been commenced on the Klondyke of the East belt, situated near Confidence. A shaft is being driven on the vein. It is the intention to sink 400 feet. The vein varies in width from 1 to 5 feet, and assays show it to be worth $19.50 per ton.——The work of adding twenty more stamps to the Shawmut-Eagle mill has commenced.——The Grizzly Co. are putting up their new 20-stamp mill, power for which will be obtained from the New Albany ditch.——The Lady Washington mine has been temporarily shut down. The mill has been hung up pending the resumption of underground operations.——The mill on the Sell mine began dropping its stamps last week.——A shaft on the Triumph mine shows from 18 inches to 2 feet of quartz.——The Pearl mine has eight men at work. It is in the Big Basin district of the East belt. The vein is 14 feet thick, and is being opened up by means of a tunnel.

The Santa Ysabel is running on ore from $8 to $15 per ton. The company is said to be earning from $2000 to $3000 per month.

Yuba.

J. W. Relley of Grass Valley has brought foreclosure suit for $20,000 against P. Campbell and the new Blue Point M. Co., whose properties are located at Smartsville.

NEVADA.

The Higbee-Russell Co., operating at Dunn's Glen in Humboldt county, will erect a concentrator at Galena to handle an ore body of some magnitude found in the Buena Vista group. Three carloads of the ore, after a long haul, netted $12 a ton. There are 200 tons of ore on the dump. The shipping ore averages about 100 ounces silver per ton. A small force are blocking out free-milling gold ore at Dunn's Glen that averages $10 per ton for the Higbee-Russell Co., who contemplate putting a mill on this property. In addition to this, the company has eleven men working on the Star group on ore that yields gold, silver and lead, and will be marketed in the shape of concentrates. The Glasgow & Western Ex. Co. has acquired fifteen claims near Battle mountain for $250,000. This property was operated in the seventies by the Battle Mountain Co., which shipped ores to Swansea that yielded 45 per cent copper, together with values in gold and silver. The long haul to market made the handling of the product unsatisfactory. The output will be treated at the reduction works at Golconda, which will be able

to handle the concentrates from 100 tons of crude ore daily.

The second payment of $1000 has been made on the Jupiter bond by C. D. Lane. T. T. Lane bonded the property near Ely for $25,000 from Scott & Peters. The terms of the sale were $1000 in ten days, $1000 in thirty days, $3000 in six months, $8000 in twelve months and the balance in eighteen months. There had been but little work done on the property. Mr. Lane immediately put men at work to prospect the ground.——The electric plant at the Dexter mill in Tuscarora is in operation and thirty stamps are crushing.——The sheriff has sold all the interest of C. V. Peck in the Douglass mill at Dayton for the amount of costs, as there was not enough to make Douglass even on a $44,000 judgment. The mill may soon be started up on the Douglass tailings.——Twenty tons a day are being put through the crushers at the April Fool at DeLamar. At the cyanide plant eight leaching tanks are operated, and the percentage of gold saved is said to be satisfactory. The April Fool began the distribution of dividends last December.——At the Magnolia a small force is at work and taking out good ore——At the DeLamar the mill is running on the usual amount of ore.

The Pioche *Record* says that prospecting at the old Comet district continues, and that Smith & Peaslee have found a 4-foot vein that assays from $3 to $11 per ton in gold.——The Freudenthal Bros., working in the old Comet mine, have discovered ore 2 feet wide carrying gold values from $3 to $98 per ton. This claim was worked years ago for silver only.——The Dexter mine at Tuscarora shipped $3300 in gold. An increased supply of water has enabled the management to increase the tonnage. At the stamp mill forty-five tons are going through daily, and at the cyanide mill thirty tons. Two shipments of cyanides were made this month.——Sinking was resumed in the Young America east shaft and three eight-hour shifts are employed. The company has been pumping steadily for three weeks.——At the Ben Hur mine, near Ely, the tunnel has reached 100 feet and a good body of quartz has been found.——The ore bodies in the Star and Grey Eagle mines on the fifth and sixth levels average 10 feet in width.

OREGON.

Democrat: A trial run of a week was made with a prospecting boat on Midas bar in Snake river near Ontario. The run was so satisfactory that it was concluded to put in a dredger of 2000 cubic yards capacity daily. E. S. McComas of Baker City is the owner of the property. The bar is nine miles long by 2400 feet in general width, and carries an average depth of gravel of 27 feet above the present stage of water. From the examinations made it is reported that the gravel yields from 40 to 50 cents per cubic yard. Mr. McComas has also leased ground for ten years to parties who are to construct three dredgers of 2000 yards capacity each.——At Bernard's ferry Mr. Bernard has three drag scrapers at work that yield $20 per day for each scraper.——Shreves & Oliver are at work adjoining McComas' ground and taking out $36 a day with two drag scrapers, the water being furnished by an 8 H. P. gasoline engine. They sold two claims to Lyon & Co. of Colorado for $5000 cash.——I. B. Hammond is building a 2000-yard capacity dredger at Nysse. —— O'Brien & Co. are building a dredger at Morton's island and the New Zealand Co. has a large dredger ready for operation at Emerson's.——There are eleven boats being changed over to chain dredgers between Payette and Great Bend, a distance of about thirty miles.——Williams Bros. are mining above Morton's island, handling their dirt with wheelbarrows and taking out $7 a day per man.——Col. Eckerson will soon begin the construction of a dredger near the mouth of Sucker creek, near Midas bar.——A strike of tellurium ore was recently made in the Oregon Bonanza mine, near Grants Pass.

In the Collateral mine, at Baker City, the average assay across a 16-inch vein was $90. There are fifty tons of ore on the dump.

WASHINGTON.

A strike of 30 inches of high-grade ore has been made in the Gray Horse claim, near Nelson. It is said to assay $40 in gold.——The Copper Mountain mine, near Republic, has stopped all surface work and is running a tunnel to get depth and strike the ore chute that was encountered in tunnel No. 2. In this tunnel they have been cutting stringers of mineral showing fair assays. The tunnel is in about 50 feet.——Development has begun on the Mountain Grouse. The ledge is about 10 feet wide on the surface.——At Republic development is being pushed on the Cantonwine group, on which the ledge can be traced for 800 feet. The outcrop is 60 feet wide and surface assays run from $2 to $3 in gold.——At the Methow mine, in Okanogan county, nickel ore has been discovered. Assay returns show 1.67 per cent nickel, valued at $13.36, and $8.64 gold and copper.——The Copper Gold mine at Bossburg has two shifts at work.——Work on the Niagara mine at Meyers Falls will be resumed and sinking continued.——The Velvet at Northport has forty men employed.——The Black Boy has a large quantity of ore on the dump.

Everett *News*: Judge Reid has signed an order appointing W. C. Butler receiver of the Monte Cristo and Pride of the Mountain M. Cos. on application of J. B. Crooker. The amount of the indebtedness of the former, as stated in the complaint, is $99,000, and the latter $125,000. Owing to the absence of transportation facilities since the Everett & Monte Cristo road was washed out, these mines have been non-productive, and the receivership deal may be merely a convenient method of handling the properties until mining operations are resumed.——The Copper King mine near Chewelah is operated under bond and lease by the Montana O. P. Co. of Butte. A tunnel was started 300 feet below the main shaft in 4 feet of ore that averages $12 each in gold and silver and 25 per cent copper.

BRITISH COLUMBIA.

(Special Correspondence).—E. Blewett has asked the Vancouver Council to take stock in his smelter company. If they do, he will bring in machinery capable of treating 100 tons daily. A smelter is needed in Vancouver, as many companies on the coast are sending sample shipments of 50 to 100 tons constantly to Wales for treatment.

Vancouver, B. C., April 25th, '98.

The mines of Kootenay have paid dividends amounting to $4,032,000. The Payne mine paid $1,800,000; Whitewater, $123,000; Hall Mines, $160,000; Fern, $10,000; Slocan Star, $400,000; Reco, $287,500; Idaho, $220,000; Rambler-Cariboo, $40,000; Goodenough, $32,500; Le Roi, $725,000; Last Chance, $37,000; War Eagle, $187,000.

Shipments continue from the Le Roi at Rossland at the rate of 200 tons per day. The ore is in three grades, the first running from three to four ounces gold, the second one and one-half ounces, the third $15.——At the War Eagle 125 men are at work. When the new compressor plant is installed, which will be about October 1st, the force will be increased to 250. The ore body on the 500 level is said to be 50 feet wide, and of this 12 feet averages $25 per ton. The mine has been opened to a depth of 625 feet. The company has made a contract with the Trail smelter to supply it with 100 tons of ore per day until the mine's new hoist is installed, when the output will be increased to 200 tons daily. The contract price is $7.50 per ton, flat, without regard to iron excess.

The tunnel on the Sovereign, near Rossland, is in 125 feet, and a 2-foot body of iron pyrites, with a little copper, found. Assays run from $5 to $15, and an average is close to $13.——The long-standing litigation involving the Mollie Gibson group, in the Slocan, has been brought to a close abruptly by the judge having nonsuited the case. When it was located, in 1896, considerable excitement was created, the surface showing and assays being of good values. It is galena, running high in silver. W. George located the claims. There are three: the Mollie Gibson, Florence and Aspen. B. White, Mgr. Slocan Star, liked the showing and got a bond on it for $79,000. Two strong veins are said to run through the three claims of the Mollie Gibson group. There is a law in British Columbia that a person may not locate two adjoining claims on one vein. George evaded this regulation by locating the Mollie Gibson with discovery post on one ledge, then locating the Florence with the width of a claim intervening, setting the discovery post on the parallel ledge. Then, on what he claimed to be a cross ledge, he located the Aspen, between the other two, and at right angles to them. The jumpers saw what was apparently three claims on one vein and placed five sets of stakes. Mr. White consummated a deal by which the bond for the property passed into the hands of R. H. Pope of Quebec. The first payment was to be made when the title was perfected. Men were put to work and shipments made, reported to have gone as high as 196 ounces of silver and 50 per cent lead. The adverse claimants began suit to enforce their alleged rights. The title of the case was Callanan vs. George, and it has been dragging through the courts. To further strengthen the case for the original locator, the claims, when surveyed, showed that all were too large, and when contracted they did not adjoin each other, and thus the letter of the law in the matter was not violated. The case of the original locator was so plainly right that the judge nonsuited the case.

The War Eagle at Rossland, it is said, contemplates equipping the mine with an air compressor that will have two 24x48-inch cylinders and provide air sufficient for forty-five drills. Instead of belting, it will be run with cotton ropes, and a 500 H. P. dynamo will provide the power. The hoisting plant will also be operated by electricity, and will be capable of hoisting from a depth of 3000 feet, the load being eight tons and the average speed 1000 feet per minute.——Ore shipments from Kaslo up to April 20th aggregated 346 tons.——During the first three months of '98 the shipments from twenty leading mines of the Slocan amounted to 850 tons.——The London & B. C. Goldfields, Ltd., of Nelson are arranging for a 40-stamp mill at Ymir.——The new owners of the Athabasca, Nelson district, will shortly let a contract for a stamp mill, compressor and steam hoist.

ALASKA.

The Last Chance G. M. Co. will install machinery on their property near Juneau to wash 300,000 tons of dirt a month under a pressure of 300 feet. The debris will be deposited on the tide lands at the Indian village, and what is now waste land will be formed into a ship harbor and water front for Juneau.——The Lurney mine will be worked by hydraulic next July. The company has invested $117,000 in property and $15,000 for machinery. There are sixty men employed and the force will be increased to 200.——At the Julian mine near Berners Bay recent work has disclosed a large ore body. The crosscut from the bottom of the shaft has cut the ledge at a depth of 400 feet. The ore is of good quality. The mill has been started.——At Silver Bow Basin the Ebner mill has started work. The ore in this property maintains a good value. The mill will be increased ten more stamps.

THE KLONDIKE.

J. Daniels and B. B. S. Phillips of Seattle and J. Deland of Kansas City left Dawson March 30th and say they will be the last to come out over the trail this season. The sun was blistering hot when the party left Dawson. The party had two dog trains, and made the trip almost light, making the fast time of twenty-one days to tide water. Many streams were open and the trail was bare of snow. Daniels and Phillips say that the output at the lowest will be $20,000,000. They confirm the story of the rich find on Monte Cristo—an island sixteen miles below Dawson. At bedrock, 43 feet, the dirt was paying $8.60 to the pan. Since then all islands near Dawson have been staked. Just before the party left gold was discovered in Dawson and the townsite was being staked. Dawson has plenty of provisions. Phillips says the Yukon will be open for navigation about the first week in May. The Chilcoot aerial tramway is in operation and charges 5½ cents a pound to the summit, 7¼ cents to Lake Linderman and 12½ cents to Lake Bennett.

IDAHO.

Between Dixie and Elk City R. W. Brownell discovered a 7-foot vein of free milling quartz of good grade. Two feet nearest the hanging wall shows free gold. It is reported that a gold button valued at $10 was taken from twelve pounds of the ore with hand mortar and pan.——A body of high grade ore has been discovered in the Badger mine, on the 150 level. Hoisting machinery will be put on the property at once.——Penneman & Yetter have crosscut the veins of the Homestake at a depth of 320 feet with a 400-foot tunnel. They have encountered 5 feet of free milling ore.——The greatest depth attained in the Florence district is at What Cheer. The lowest tunnel taps the vein at 226 feet depth. The Banner shaft is 176 feet, the Poorman 166, the Blossom and Waverly each 160, the Goldbug and Redbird considerably over 100; yet in no instance has a vein in the above list proved a disappointment, either in size or value of the ore body. On the contrary, every vein has improved with depth. The Banner hoist is being put in place for sinking a new shaft 300 feet; the Poorman will resume sinking as soon as the shaft is installed. Work on the new Elkhorn shaft is under way, and the Hiyu, Waverly, Blossom and Mikado will have deep shafts before next fall.

The 200-foot tunnel on the Golden Gate mine, near Moscow, will be completed May 15th, when the property will be turned over to the Pleiades M. Co. The prospects are said to be encouraging and the company contemplates erecting a mill.——In the Hiyu mine, near Florence, a new strike is reported on the 90-foot level, showing a vein 160 feet long and from 4 to 20 feet wide. The assay return from $1.70 to $297.78 per ton. A heavier hoisting plant and a skip capable of carrying a ton of ore are to be installed this season, together with a concentrating table. It is said the company contemplates enlarging the 5-stamp mill. H. B. King is Gen. Mgr.——It is stated that the new mill on the Morning Glory mine at Mullan will be the largest in the Cœur d'Alenes, having a capacity of 1500 tons of ore daily.——Near Preston a force is at work on the War Eagle, from which a carload shipments will be made. The ledge is 5 feet, free milling, and yields good values. H. A. Meyer of Preston is the owner of the property and he will at once make arrangements for erecting a mill.——The Lucky Boy mine in Boise basin has crosscut the vein, which is 25 feet wide on the 250-foot level, with 10 feet of $10 free milling ore, not taking into consideration an 8-inch seam of $50 free milling ore.

UTAH.

The Mercur M. Co., in the distribution of its dividend last week—which was the thirty-ninth in its history—made the total paid to date in profits $1,030,000. This property began its paying history in September, 1893. The first dividend was distributed among seventeen stockholders, residents of Utah and Nebraska. To-day there are 351 shareholders, scattered from Connecticut to California and from Canada to Mexico. The *Tribune* says that to the Mercur's success the cyanide process is more largely indebted for its present popularity than it is to the achievements of any other property on the western hemisphere.——A carload of ore, amounting to 200 tons, from the Swansea netted the company $3400. Silver and lead predominated, but a fractional amount of gold was also present. The property is situated at Silver City.——The Ophir Hill property will resume work within a few days. The ore from this property, of which 9000 tons were produced during the last year it was worked, is in active demand at the smelters.——Work on the Fairview group at Tintic has started again under a lease for eighteen months for $75,000.

By a recent option G. S. Peyton acquires the right to purchase, within six months, the controlling interest in the Northern Light M. Co. at 60 cents a share. On the same basis the holdings of the company would sell for $240,000. He will prospect new ground while running the mill upon ores that have been blocked out.——The Mercur M. Co. reported with 1000 pounds of auro-cyanides of the value of about $25,000. The consignment represents a run of fifteen days at the Mercur mill. The strike of a new ore body is reported in this property at the 400 level.——At the Hercules mine, near Lion Hill, the vein has widened to 12 feet of a good grade of ore.——The tunnel of the Dalton at Marysvale has reached 750 feet. The Mgr. expects to drive 500 additional feet to reach the vein.——In the Mammoth, on the 800 level, an ore body has been carrying silver, lead and gold.——A pay streak of ore has been found on the 300 level of the Homestake at Tintic.

Nelson & Sterling secured a bond for $30,000 and the renewal of a lease which gives them four years' time on mining property near provo.——At the Old Jordan & Galena at Bingham, from 450 tons of crude ore put through the concentrators every sixteen hours 150 tons of concentrates are derived.——S. Newhouse paid $142,237.72 cash for the Stewart and fifty-seven other claims at Bingham. Work has begun at different places on the group and will be extensively pushed.——The West Mountain G. and S. M. Co. is resuming work on the St. Patrick group, extending the main tunnel which shows 3 feet of cyaniding ore that assays $8 per ton.——The tunnel on the Greek group cut through a 2-foot ore streak that assays thirty ounces silver, 17 per cent lead and $2.50 gold.——Two carloads of good grade have been shipped from the Tiewaukee this month.——The Phœnix will market about 125 tons of good grade ore this month.——The Old Telegraph has twenty-five carloads of ore to its credit since April 1st.——Thus far this month the Spanish has marketed thirty carloads.——Operations have resumed at the Winnamuck in the 400.——The vein on the west dip near Mercur has been developed for a distance of two miles and a half, and deep shafts are being sunk to catch it on the dip.——The Emerald mine, near Logan, is making a good showing. A body of steel galena and lead carbonates has been uncovered. Samples of the galena assayed 80 per cent lead, and the carbonates show nine ounces silver and $3 gold.

The Park City *Record* reports it certain that the Silver King will build a mill. The removal of cottages on the mill site has begun, and Mgr. Kearns says that as soon as the ground is cleared surveyors will establish lines for the mill and grading begun. The mill is to be of a combination character, with sufficient capacity to work the mine's output of second-class ore. Power enough will be put in to handle the product of the mine's free milling ore, as well as the gold ledge.——The Hassen mine will hereafter be called the Gold King.——The ore shipments from Park City were: Silver King, 960,680 pounds; Anchor, concentrates, 241,220; Ontario, 59,880.——Shipments from Silver City were: South Swansea, three; Swansea, five, and Iron mine, nine carloads.——The mill at the Sacramento is to be enlarged and increased to over 200 tons daily capacity.——McCauley Bros. have in their mine near Alpine a vein of ore from 4 to 25 feet wide, carrying from $4 to $25 in gold and four ounces of silver.——At Ashbrook the Salt Lake M. & I. Co. are producing twenty-five tons of ore daily.——In the Golden Star the ore body is 4 feet wide. Last season's shipment showed an average valuation of $148 per ton.——Wadley Bros., at Pleasant Grove, resumed work on the Lady Ann tunnel.——The Waterfall mine has two carloads of ore on the dump.——At Willow Springs, on the C. E. Allen group, the ore shows 25 per cent lead, 96 ounces silver and $18 gold per ton.——The Century, near Kelton, is making regular bullion shipments.——On the White Swan 2 feet of $33 ore has been uncovered.

MONTANA.

At Camp Creek E. L. Mahoney has three carloads of ore for shipment that assays 25 per cent copper.——The Speculator mine has reached 850 feet depth and will be continued to 900 feet.——The Moulton mine, at Barker, will ship 8000 tons of ore to the smelter at Great Falls.——A fifty-ton concentrator will be erected on the Daisy mine at Cooke in June. Enough ore is blocked out to keep it in operation four years. Sixty men will be employed.——The Boston & Montana Co. filed a suit in the U. S. Court against the Chile M. Co., which is now understood to have a lease on the Rarus mine. The plaintiffs set out the same facts in their complaint as alleged in their former suit against the Heinzes and the Montana Ore Purchasing Co., and claim $75,000 damages for the alleged value of ore taken from beneath the surface of the Pennsylvania through the Rarus mine. The same questions are involved as in the former suit, especially the old one of a divided apex. The arguments will be heard at Helena, April 29th.——E. Braden, assayer in charge of the U. S. assay office at Helena, estimates that from 1881 to the end of 1898 the Butte mines produced the following values:

Gold	$ 11,148,075 74
Silver	148,883,234 29
Copper	225,055,467 02
Total	$385,086,777 05

The Ruby mine will sink another 100 feet, making the shaft 400 feet.——The Comet Co., near Basin, contemplates the building of four miles of railroad to the mine for the shipment of accumulated tailings of an estimated value of $2,000,000.

Development work has been pushed by the Butte & Boston Co. on the Michael Davitt claim, which the company recently purchased for over $600,000. A raise is being made from the 350 workings to the surface for a three-compartment shaft, through which the Davitt and adjoining ground will be worked.——A Spokane company will develop the Climax claims near Sylvanite.——At Camp Creek, Bowman & Co., on whose property a tunnel of between 600 and 700 feet has been run, are extending the tunnel.——Some good gold has been shipped from Placer No. 3, owned by A. W. Bernard. This mine has been a producer for years, and, though the ore bodies are not large, the values run high in gold and silver—as high as $200 to the ton.

WYOMING.

Mgr. Green has begun the construction of a pipe line thirteen miles long preparatory to opening hydraulic operations on an extensive scale near Atlantic City.

It is estimated that there will be expended in the development of placer and quartz mining in Lewiston district this summer between $300,000 and $400,000. A Chicago company headed by G. R. Davis, who have purchased 300 acres of gravel lands, and a New York company that bought an extensive acreage at Devils Gate, begin work May 1. Salt Lake people will build a cyanide mill at Lewiston to work the low-grade ores of that section.

The Spring Creek placer claims near Cheyenne were sold to Sturgis & Weir for $18,000; a cash payment of $5000 was made. Development work begins at once.

SOUTH DAKOTA.

Last month's ore shipment from the Wasp No. 2 mine, near Deadwood, amounted to 400 tons of a gross value of from $40 to $60 per ton gold.——J. J. McLurin has bonded the El Dorado, near Hill City. Permanent improve-

ments are being made. Milling ore has been taken out valued at $28 a ton gold.——J. Barr is investing money in the Bismark and Big Hit mines, near Keystone. J. Mattes is the Gen. Mgr. There is a tunnel 270 feet long at the bottom of a 180-foot shaft in the Bismark which crosscuts a body of ore 43 feet wide. The Big Hit has a 200-foot shaft and 400 feet of drifts and crosscuts. The ore averages $8 free milling.——Eastern people have bonded a portion of the Lucky Boy property for $90[illegible]—$2000 down.— The Edna M. Co. at Garden City has opened a vein of ore that assays as high as $48 per ton in gold.

MICHIGAN.

The annual report of the Hecla M. Co. for the year 1897 shows reciepts from bullion, $170,582; miscellaneous $2877; total $173,459; total expenses were $212,898, showing a loss of $39,439; deducting this from the balance of $71,219 brought forward from 1896 left a total of $31,780. From this dividends amounting to $30,000 were paid, leaving a balance of $1780 at the close of year. The company has paid a total of $2,175,000 in dividends on the capital of $1,500,000. The products were 406 ounces in gold, 215,431 ounces silver, 184,836 pounds of copper and 1,990,175 pounds of lead. The total amount of ore taken out was 4403 tons first class and 768 tons second class. The mining cost was $20 56 per ton of first class ore, or $17.53 per ton including all ore.

The Marquette *Mining Journal* states that Boston people have purchased the property of the old Winona M. Co. for $250,000. The property comprises 1480 acres twenty-eight miles south of Houghton. There are two shafts down, one 30 and the other 40 feet. Test pits have proved the property for a distance of 1650 feet.——Dredging has begun for the new docks of the Quincy M. Co. at Pewabic Sands, where the Quincy will erect a new smelter. Work will be pushed rapidly, owing to refusal of Detroit and Lake Superior smelters to treat Quincy mineral after May 1.

A prospect shaft has been started on the Winona copper property, near Houghton. Surveys will be made for a mill and water supply.

COLORADO.

The Dollie B., at Leadville, resumed shipments to the smelter the 20th inst. Everything is in condition to take care of all the water the workings will make.——Several new leases were let on the Nisi Prius Con. M. Co. April 22nd. The Hall shaft lease is reported to have cleared above $10,000 in March. ——Forty wagon loads of ore, each carrying seven tons, is the daily output from the Ibex gold mines. This tonnage is divided between the home smelters, the oxide silica ores being taken by the Arkansas Valley and the copper-iron sulphides to the Bimetallic. About 525 men are on the pay roll. This output is kept up twenty-six days in the month, besides the development work which is kept years in advance of the stoping. About two-thirds of the underground men are kept on prospect work. The daily output of oxide iron is 1000 tons. About thirty railroad cars are billed out of the city daily on the high line alone. The Rio Grande is also taking out several trains daily of carbonate-iron and sulphide ore. Several additional iron shippers have been added to the list.

The Republic and Mary McKinney, at Cripple Creek, are the big producers of the northwest slope of Raven hill. The ore chutes in both properties are long and wide, and as depth is gained the values increase. The ground is being worked by different sets of lessees and ore is being shipped from four shafts. The company has in the neighborhood of $40,000 in the treasury from royalties.—— The daily output from the Killum and Ogilvie lease of the Hull City placer is one carload that runs between three and four ounces.—— The Lillie during the present month will increase its output over last month's by many tons, the tonnage in March being 1250. The shaft is now 440 feet deep.——A steady producer is probable from the development on the Zeolite, recently taken under lease by Cobb, Wilson & Co., who drove a crosscut from a shaft about 50 feet in depth and found a body of ore which returns shipping values of $30 per ton. They have about 25 feet of mineral which averages $30 without sorting.——At the Legal Tender sinking has been resumed and 100 feet will be added to the shaft, when the total depth will be 625 feet. The latest work in this mine shows ore bodies regular and uniform in value, which will make the output for April reach quite close to 2500 tons. ——A new strike was made this week in the 300 level of the Christmas. A 3-foot vein of ore running $60 has been cut.——Riggs & Co., on the Colorado City, are taking out two-o[illegible]ore from a 10-inch streak at 75 feet depth. The Fluorine has been shipping from fifteen to twenty tons a day for the past four months.——The Comet-Emma at the second level has a streak of ore 3 inches wide that runs from $150 to $200 per ton. ——An assay in the Holmes lease of the Pharmacist yielded at the rate of $240 per ton.—A strike of importance was made last week on the Christmas. At a depth of 300 feet a vein 3 feet wide was cut which gives assay values of from $[illegible] to $[illegible] per ton.——The Specimen has put down a shaft 200 feet and is following the vein with drifts. The vein shows 3 feet of quartz and talc, which assays as high as $586 to the ton. The Lucky Gus lessees have another consignament of 100 tons of ore at the sampler.

At La Plata the Little Jane mine shipped thirty tons of twenty-ounce gold ore. They have 4000 pounds of ore that samples $7 a pound. The ore chute has an 18-inch streak of tellurium ore. The company intends to sink 400 feet. The Keystone has 3 feet of two-ounce gold ore. They are taking out two cars a week. The Columbus has cut a 3-foot streak of tellurium quartz. A reduction plant is contemplated on this property.——The damage done by the fire at the Seneca shaft, Leadville, is to be repaired at once, and McNiven & Co., the lessees, will continue operations as in the past. The fire will cut down the shipments from the Seneca combination for a short time. The Seneca Co. is not doing any company work, but has a number of leases going. From the Seneca shaft proper McNiven & Co. have been shipping from thirty to fifty tons a month of carbonate ore from a depth of 275 feet. The same lessees are operating the Lent shaft of the same combination, from which they are shipping from 500 to 600 tons of iron ore a month. La Bonte & Co. are operating on the Bullion shaft and shipping 300 to 400 tons of iron ore a month. Fuller & Co. are operating the Keene shaft, from which they are shipping sixty to seventy-five tons of carbonate ore a month. Parker & Co. are operating the Ponsardin shaft at a depth of 430 feet in the sulphides. Dix & Co., working the Gambetta shaft, made a shipment which netted a good return. They have a contact 40 feet in thickness.——The idea has been abandoned that Denver people are to swing the Smith-Moffat interests in the down-town area and local mining men are at the head of a movement to organize the Home M. Co., with a capital of $50,000—that is, 50,000 shares at $1 each. The first assessment on the stock is to be 30 per cent and then 10 per cent each month until enough money is raised to put the mines in condition to work. Bodies of mineral now under water are known to be opened in different workings of the properties, and if the new enterprise can be carried successfully, it will mean much to the camp in general, and more especially to the merchants of the town. When again in operation, this down-town area alone would employ at least 800 men. Should the Home M. Co. be able to resume pumping, it will take from sixty to ninety days to get out the water and resume mining.——The Big Four Co. is again in operation. At present they are not shipping heavily, but carrying on development work. Shipments amount to about 200 tons of sulphide and oxide ores. It is the intention to carry the shaft down to open the ore chutes of the lower contact. The operations at present are carried on in the different workings between the 200 and 600 levels.

The Leadville *Reporter* says that everything looks favorable for the consummation of the project to form a local company for the unwatering of the down-town mines.——The Independent mine at Crestone, at a depth of 280 feet, opened into a vein 34 feet wide that mills $35 per ton. The 10-stamp mill is cleaning up from $3000 to $4000 weekly.——H. C. Thompson has given a bond on his property for $40,000.

The Silver Mountain and Pittsburg, near Empire, continues to show large bodies of ore and the operators are getting ready to sink the shaft 200 feet deeper.——At the Newfoundland mine, near Central City, the water is out of the shaft, which is 540 feet deep. Mgr. Mabee reports ground above this to work on before commencing other operations. ——The Star of the West property is operated by the New York & Indiana G. M. Co., which in sinking the shaft at a depth of 235 feet has opened up a pay streak of smelting ore, showing gray copper mixed with iron. Another contract will be let at once to sink 75 feet.—— The Topeka mine is making heavier shipments than for some time past, and is also shipping some good grade smelting ore which does not include the high-grade ore.——Cook & Co., in the Toledo adit, have opened into a streak of smelting ore 18 inches in width—copper, carrying gold, that will assay 15 ounces gold to the ton. They have opened up a block of stoping ground, and in addition to the smelting have had plenty of milling ore.——In the lower level of the Seaton mine, Mgr. Goldsmith reports streaks of lead and copper ore which will run $50 per ton.——The receipts of gold at the Denver mint for the week ending April 16th were $364,425 17. During the corresponding week of 1897 the receipts were $240,730.54. The value of the gold deposited during the present year is $5,384,832.49, a gain over the same period in 1897 of $3,159,713 84. ——The Gaston at Central City, from a wagon load or ore sent to the sampler, netted $522.30. ——The Foot & Thompson Dhu has been leased to S. B. Shaw. The property has a 6-foot vein at a depth of 400 feet.——At the Isabella, at Cripple Creek, the tonnage for the month of all grades will be between 800 and 900 tons that will have a gross value of about $35,000. In the new shaft drifts have been started at the 630-foot level.——Jennings & Kerr have received returns from ten tons from their lease on the Lillian Leland, which averaged $46 and was taken out in the course of sinking the shaft. At a depth of 80 feet the lessees have 12 inches of ore, and assays are obtained running from $50 to over $500. ——The work of sinking for an additional level on the El Paso Gold King is under way; ore is being broken at the 500 level. The output averages about twenty-five tons per day. ——The Anchoria-Leland will output this month an average of fifteen tons per day. It will run close to $40 per ton. The mine is earning the regular dividend of $6000 per month. Connections were made with the Anchoria-Leland shaft and the Cripple Creek and Gold Hill tunnel. The tunnel cuts the shaft at a depth of 652 feet. The vein has not been entered below the 350-foot point.——The daily output of two leases on the Deadwood runs about ten tons a day and averages from $40 to $90 per ton.——The Fox lease on the Hull City placer sent out a three-carload graded shipment. It will run from two to eight ounces.——An output of close to 200 tons a month is made from the Gold Dollar. The ore averages $40 and comes from a 4-foot body. ——The Denver *Record* says that work in the lower tunnel of the Independent mine at Spanish Creek opened 18 feet of ore averaging over $60 per ton. A large amount of ore has been blocked out and a 10-stamp mill is talked of by the owners.——During March the Lillie Co. at Victor shipped 1200 tons of a gross value of $71,000, and a net value of $58,000. The operating expenses amounted to $12,000, leaving a net profit of $46,000.——The *Evening Telegraph* says that the Gold Coin at Victor made a strike in the fourth level of about 4 inches of ore running $7000 to the ton. The managers are sacking the matter and will ship it under guard.——Returns from the first shipment from the Hagerman lease on the Orpha May went at the rate of $52 per ton.——Since February, 1893, the stockholders of the Victor have received $900,000 in dividends. At present the mine has more ore in sight than ever before. The same company has another good property in the Golden Cycle group at Goldfield. In the Legal Tender there is a large body of ore blocked out in the 500-foot level. ——The Strong is loading from four to six broad-gauge cars per day. About half the tonnage is sent to the smelters, the balance being treated at Colorado City. The ore averages from $50 to $60 per ton.——The Moon-Anchor shipments of the past week were 125 tons of smelting ore and forty tons of mill ore. ——Specimen shipments for the past week amounted to forty-nine and a half tons of ore. The ore on lease E ran $27 and the ore on lease Q $40.——It is reliably reported that the Buffalo and Cripple Creek struck ore in the Newell tunnel, which is over 1000 feet long. A few days ago a large vein was crosscut some 500 feet from the surface and a short drift started. Assays run as high as $50. Six veins have been cut by this bore, but no drifting has been done. Assays have been obtained on two other leads in the property at the point intersected that run from $10 to $20 without sorting.

A large area of placer ground in Summit county, including some of the best known and richest placer mines in that county, will be worked by the Pence-Miller Placer G. M. Co.; capital stock, $3,000,000.——The crosscut from the seventh level of the Terrible mine, near Georgetown, cut the ledge a few days ago. It was driven 350 feet through the granite at a cost of about $3000.——The *Investor* says a contract has been made between the Elkton Con. M. Co. and the Colorado-Philadelphia R. Co., for the treatment and reduction of all the ore of the former running less than $100 per ton for the next fiscal year.——The Tillman property, near Eldora, owned by the Emma A. G. M. Co., has been leased and bonded to Brown & Convers for $25,000, for eighteen months, with 15 per cent royalty to be paid on all the ore shipped.——An 18-inch vein of copper has been opened in the Antietam. The returns show over $50 a ton.——For the first quarter of '98 Rico shipped 225 cars of ores and concentrates compared with 109 in the first quarter of '97. The gain equals 116 carloads, or 106 per cent.——W. A. Johnson & Co. at Leadville have started work on the Mike and Star property and are draining the mine. The shaft is 500 feet in depth and bodies of sulphide ore are already blocked out. These properties contain large deposits of iron sulphides which several years ago could not be worked on account of treatment charges, the ore being of a refractory nature, but modern improvements of smelting have overcome these obstacles.——The Big Four M. Co. is working fifty men and is pushing developments, very little ore being shipped. The ore chute in this property is small and narrow, but rich.—— Vivian & Co. are pushing work in the Garibaldi tunnel, which is now more than 1300 feet long.

At the Gold Sovereign, Cripple Creek, the output has been steadily increasing, and this month has been such that for the past ten days the company received more royalties from the lessees than it did through the entire month of March. The drift at 80 feet is showing a chute 72 feet in length, averaging 3 feet wide, and shipping at an unusual average. The ore in the shaft has been of low grade until of late, and about the 100-foot level a richer chute was entered, and this has been gaining until at 140 feet. Three feet of ore shows an average value of $70 per ton. On Monday night four carloads were shipped—three of them from the Lovett and one from the other three workings.——At the Free Coinage group the territory is worked in small blocks by lessees and ore is shipped from three shafts.——The Pinto Co. have sunk 350 feet, and at this point are mining high-grade ore. The output is about fifty tons per week, and the ore averages better than $150 to the ton. The property contains the south extension of the Maloney vein, opened on the Orphan Belle fifteen months ago. Three shifts are employed sinking for an additional level. It is down 75 feet below the 350-foot point. Drifts will be extended when it has reached a depth of 450 feet.——Fisher & Perkins have their shaft on the Free Coinage group 75 feet below the 350-foot level, and expect to start crosscutting when 25 feet more work has been accomplished. They are making an output of fifty tons of high smelting grade ore a week, and have opened a chute for 185 feet on the vein that will average close to 3 feet in width. ——The Portland has increased its dividends from $30,000 to $45,000 per month.

NEW MEXICO.

W. Doty has cut into a vein of gold and copper-bearing quartz that promises well. He will sink in the vein. The prospect is near Red River.——Hatton Bros. have resumed work.——The Two Sisters will drive the tunnel another 100 feet. Their tunnel is already in 160 feet and is in low-grade sulphide ore. The tunnel has been in this ore for the last 60 feet, and crosscutting 25 feet has failed to find any wall.——C. Compton & Co. sold to E. C. Abbott a four-eighths interest in the Ironclad placer claims, embracing 118 acres of ground near Red River.——In the Red Bandana group, near Elizabethtown, a 2-foot ledge was uncovered that assays $200 per ton. The claim in which this rich ore was found has not been worked in recent years, as the adjoining claims furnished the mill with sufficient ore. The new strike is of uniform character.——The Montezuma M. Co. of Elizabethtown has put in a plant to sink their shaft 150 feet.——The Argue placer dredge at Elizabethtown is in constant operation. The prospects are that the placers will take out more gold this year than ever before.——At the Ortiz mine, at Dolores, the water supply is being increased, after which the machinery will be increased to treat 100 tons per day. The shaft is down 300 feet and sinking continues. The vein varies from 7 to 10 feet and is partly free-milling ore and partly a concentrating proposition.——The shaft at the Cochiti has reached 180 feet and the ore runs $18 per ton, averaging $12. Supt. Merrill estimates an average profit of $5 per ton on the basis of 90 per cent of the mineral being saved in its treatment.

The Standard mine at Gold Hill has resumed operations after an idleness of two years.——Thirty men are working in the Simpson smelter at Copper Flat. About sixty

STEAMERS TO KOTZEBUE SOUND.—PACIFIC COAST and KOTZEBUE SOUND TRANSPORTATION & TRADING COMPANY'S (JOHNSON-LOCKE MERCANTILE COMPANY, Agents,) New Steamer, the GRACE DOLLAR, capacity 300 passengers and 800 tons of freight, will leave San Francisco June 1st for St. Michaels and Kotzebue Sound.

Passengers intending sailing for Kotzebue Sound are reminded that the GRACE DOLLAR is a newly built, triple-expansion steamer, lighted with electricity, with every modern convenience. Her bows will be sheathed to enable her to make early progress through the breaking-up ice in Kotzebue Sound, thus landing her passengers ahead of sailing vessels or other competitors.

Passage on the GRACE DOLLAR insures an early and a safe arrival in Kotzebue Sound.

The GRACE DOLLAR insures at lowest rates of insurance, while many of the antiquated sailing vessels now being advertised are forty to forty-five years old and cannot insure at any rate.

The KOTZEBUE SOUND TRANSPORTATION & TRADING COMPANY will erect at a convenient point on the Sound a store, trading post and warehouse, where supplies will be kept for the convenience of miners.

THE INITIAL TRIP OF THE GRACE DOLLAR WILL BE MADE FROM SAN FRANCISCO TO KOTZEBUE SOUND.

Thereafter she will ply between St. Michaels and Kotzebue Sound, making three or four trips a month, and will connect with the steamer "Morgan City" for San Francisco.

For freight and safe passage apply to the JOHNSON-LOCKE MERCANTILE COMPANY, 609 Market St. (Passenger Office), or 204 Front St.

men are employed in the mine.——The Pacific mill, near Silver City, is running steadily, turning out concentrates.——At Alhambra the old shaft has been unwatered and the entire mine will be overhauled and retimbered.——The shaft on the Julia is down 65 feet and being timbered. The owners will push development work.——At Golden the Black Hawk mine carries silver, lead and gold aggregating $40 per ton.——In the Collins group the main ore body is copper, with a 4-inch streak of gold ore.

ARIZONA.

The Guijas G. M. Co., near Oro Blanco, is pushing developments with satisfactory results. The property is opened to a depth of 100 feet and an ore body of nearly solid pyrites exposed. Two hundred tons of high grade ore are on the dump.——At the Golden Star property a crosscut has been driven 150 feet and the ledge justified all expectations. A tunnel has been driven along the vein 250 feet and the ore demonstrated to be of good character. A sample of five tons of unassorted ore gave an average value of $35 per ton in gold. The velvet group is also in process of development and showing up well in free gold.——The Turning Point mine, near Casa Grande, is in active operation. Gold and silver ore has been opened up and a mill is shortly to be put in. The property is owned by St. Louis people.——The Blue Jay mine in Pima county has struck several good ore bodies. Seven tons are on the dump that are expected to bring about $1000.——Rye, Gila county, gives information of the discovery of two coal beds near the surveyed line of the old Arizona Mineral Belt railroad. The two seams are about 60 feet apart, one being 20 inches thick and the other about 4 feet. The coal burns well and looks to be of first-class quality.——At the Grand Reef mines, near Range, the power drills are in over 300 feet. The property will be thoroughly developed before reduction works are built. J. W. Mackay of New York is furnishing the capital for development.——At the London and Gallen copper mines in the Whetstones work is progressing satisfactorily. A shipment of 500 sacks of ore was made, which will be followed by other shipments from time to time. Seven men are pushing work on the main tunnel, which is in 120 feet. It is expected 90 feet more will reach the ledge. A depth of 300 feet will have been attained on the ledge when that ore body is reached.——Another strike has been made in the Azurite mine near Tucson. A few days since there was a strike made in the main drift of a large body of medium grade ore, the average of which is about 10 per cent copper, some gold and silver. The latest strike is in the east drift on the 200-foot level. The ore body is a fraction over 5 feet. Over 3 feet is black sulphurets, which gave returns of 34 per cent copper, 18¼ ounces silver, $3 gold. On hanging wall is 1¾ feet of green carbonate, which gives 10 per cent copper, 9 ounces silver and a fraction over $3 gold.

The Bradshaw G. M. Co. will soon resume work on its properties at Minnehaha.——Several inches of ore has been struck in the Empire mine at Chloride that is said to average 1.121 ounces in silver.——Fifteen claims are being developed in the Huachucas of Cochise county.——At the Blue Jay mine, near Tucson, there are seven tons of ore on the dump that runs over $100 per ton.——The Guijas G. M. Co. has reached 100 feet depth and has taken out 200 tons of gold ore of good grade.——The Storm Cloud mine in Yavapai county, being developed by Eastern capital, has reached 150 feet depth and is making weekly shipments of bullion.——The C. O. D. mine in Mohave county has 10,000 tons of ore on the dump and is turning out fifty tons of concentrates daily.——The vein in the Red Rock mine, near Prescott, is from 18 to 24 inches wide, and the ore is valued at $60 per ton gold.

The United Globe mines are running their large furnace and making a fair output of copper. A furnace of 150 tons capacity has been ordered. The company's mines are said to have shown considerable improvement of late.——La Fortuna gold mine, in Yuma county, has been opened to a depth of 600 feet and work is pushed faster than the ore is taken out, and the ore reserves are growing. The mill crushes seventy-five tons of $25 rock per day, saving over 80 per cent and affording an output of $45,000 monthly. C. D. Lane owns the controlling interest.——The Black Warrior Copper Co. has purchased five copper claims. The Black Warrior Co. now own eighteen claims in Webster gulch, on some of which they have expended in the aggregate $70,000. A large amount of ore has been extracted. Development work and the hauling of ore to the smelter have been resumed.——The Pinto Creek M. & S. Co., near Globe, have resumed development work on their Pinto creek group, which consists of ten claims. Supt. Calder is pushing work on the Yo Tambien with three eight-hour shifts. An incline shaft, all in ore, is down 70 feet. A crosscut was run, tapping the vein in 40 feet, where a drift is at present in 130 feet. The vein in the drift is from 4 to 10 feet in width. The ore is largely quartz, carrying gold values, besides copper, which is in the form of carbonates, oxide and sulphide. The vein also carries lead and silver. Some work has been done on the Winona. Three parallel ledges have been discovered on this claim. The ore is quartz, carrying gold and crystallized lead. The north ledge has been crosscut and is 7 feet wide. At the present rate of development machinery will soon be required for deeper sinking.

MEXICO.

It is stated that the sale has been made of the Colorada-Creston Co.'s properties at Minas Prietas and La Colorada. The purchaser is the same company that bought the Amarillas and Grand Central.

The interests of the Moctezuma and Cleveland M. Co. and El Tajo M. Co. at Lampazos have been consolidated, and work has begun on an extensive scale. J. Frush has charge.

Coast Industrial Notes.

—Flour is rising in price at the rate of 25 cents per barrel per week.

—Wheat went to $1.80 per cental in San Francisco during the week.

—A. S. Hallidie and associates of San Francisco propose working the coal deposits at Winter Harbor, Quatsino sound, B. C., recently illustrated and described herein. They are shipping a complete plant for mining the Quatsino coal.

—The Denver & Rio Grande Railway Co. proposes to compete with the Canadian Pacific for Oriental business, and contemplates the establishment of agencies in Hongkong and Yokomama. This traffic would be diverted from the Victoria line of steamships to those that run to San Francisco.

—The Santa Cruz powder works now employ 228 men. The Government contract for powder amounts to $3,000,000. This week 76,000 pounds of brown powder were shipped East. Powder is now sent in charges ready for use. Contracts for cartridges for the large guns are being filled. In each cartridge there are 275 pounds of smokeless powder. The works were partially destroyed by an explosion on the 26th inst. This will necessarily delay the filling of all contracts.

—A singular commentary on the cost of transportation as an element in the cost to the consumer is afforded in the ultimate "value" in this state of Cumberland coal, used largely by blacksmiths. The Maryland Coal Co. gets 85 cents a ton for it at the mine. It is railroaded to Point Locust, Md., shipped thence round the Horn to San Francisco; sent from here to California interior points; then sacked and carried on mules and burros to several almost inaccessible points where mining is carried on, finally costing the consumer 5 cents per pound, or $100 for what originally cost 85 cents.

—The California Development Co. is credited with intent of another effort to irrigate the Colorado desert. It is estimated that the entire system can be constructed for $300,000, and that a canal can be built large enough to carry sufficient water to irrigate 1,000,000 acres of land. No pumping works will be necessary, the canal having throughout its entire length a natural fall of 330 feet from the point where the Colorado river is tapped to its extreme northern limit in Riverside county. The lands to be reclaimed are situated in San Diego and Riverside counties, and in the northern corner of Lower California. The center of the tract is about 100 miles from the city of San Diego. The acreage of first-class lands reclaimable by the proposed system of canals is given at, approximately, 1,600,000—900,000 being in the United States.

—Consular Clerk Murphy from Colon reports the completion of the La Boca dock, the Pacific terminus of the Panama canal. The real importance of the work at La Boca, says Mr. Murphy, remains to be demonstrated. The tide fluctuation at Panama amounts to over 25 feet, and at the lowest ebb the bottom of the sea is exposed for a mile or more from the shore. As to whether or not vessels will venture to use the La Boca dock, time alone will prove. He continues: "I have heard the opinion expressed that the dock will prove to be a complete success. On the other hand, I have heard it even more confidently stated that this is only another example of the waste which has characterized the management of this apparently simple undertaking. To one traveling across the isthmus, it appears that there can be no obstacle to the completion of the canal which money honestly used, engineering skill and common sense can not easily overcome. The land is most level, the highest point being little over 300 feet above the sea. The distance is only about forty-five miles. The freshets of the Chagres river appear to be the only difficulty, and it appears that provision for the storage or escape of such water can be made. The work, if it were in American hands and under American control, could, I believe, be completed in a few years at a moderate cost. About one-half of the work—fourteen miles at this end and six at the other—has been completed or partially completed, though the freshets of the Chagres river have caused great damage during years of neglect."

Commercial Paragraphs.

THE Colorado Iron Works Co. of Denver, Colo., have an order from John A. Moore for one water-jacket smelting furnace, to be erected in the San Juan district.

ADAM SCHILLING & SONS shipped to the Inyo Mining & Development Co., Keeler, Cal., on the 12th inst., one of their new improved mining hoists, direct connected with a 25 H. P. Golden Gate gas engine.

AN article on the tanks used in the Pelatan-Clerici process, recently published, referred to the tanks used. The Risdon Iron & Locomotive Works, San Francisco, are the manufacturers of those tanks on the Pacific coast. The Risdon Iron & Locomotive Works have recently built three mills using this process.

THE Colorado Iron Works Co. of Denver, Colo., recently shipped two carloads of machinery to old Mexico—one car being water jackets for the Great Central Mexican Smelting Co. of Aguascalientes, Mexico, and the other car constituted amalgamating machinery for the La San Gonzalo M. & M. Co., Gabriel, Mexico. They also made shipment of one carload of water jackets for the Arkansas Valley Smelting Co., Leadville, Colo., and one 44 cu. ft. capacity slag truck for the Copper Queen Con. Mg. Co., Bisbee, Arizona.

Personal.

W. B. FISHER continues Supt. Gold Blossom mine, Ophir, Cal.

J. LEGG is the new Supt. Northern Light mine, Park City, Utah.

G. F. SHERMAN is appointed Supt. Empire mine, Grass Valley, Cal.

A. BUCKBEE has resigned as Supt. Eureka Hill M. Co. at Eureka, Utah.

C. ROOKLIDGE becomes Supt. Queen of Sheba mine, Spring Creek, Utah.

D. E. BIGELOW of the Union Iron Works, San Francisco, is in southern Oregon.

J. LAWLER, owner Hillside mine, Yavapai county, Ariz., is in San Francisco.

GEO. W. BARNHART of San Francisco has returned from a business trip to Marion, O.

H. E. PICKET, managing owner Grand Victory mine, Placerville, Cal., is in San Francisco.

CAPT. THOS. MEIN is at Hot Springs, Arkansas, and goes to Douglas Island, Alaska, in June.

J. MCKELVEY, a mining capitalist of Oakland, is examining properties in El Dorado county, Cal.

L. F. WRIGHT, Gen. Mgr. Mountain Copper Co., Keswick, Cal., has returned home from San Francisco.

L. L. MEYERS, Supt. N. B. hydraulic mine, North Bloomfield, Cal., has returned home from San Francisco.

R. H. POSTLETHWAITE is superintending the erection of two Risdon gold dredgers at Breckenridge, Colo.

COLORADO'S STATE GEOLOGIST, T. A. RICKARD, has returned to Denver after a protracted absence in Australia.

GEO. H. EVANS, Gen. Mgr. California Gold Mines Co., left this week for London to reorganize the Banner M. Co., Butte county, Cal.

A. E. HOGUE, Gen. Mgr. The Universal Corporation, Ltd., of Saskatchewan, B. C., is in San Francisco getting pointers on gold dredging machinery.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SINGLE-TRACK RAILWAYS AND CARS.—James Hopkirk, Oakland, Cal. No. 602,601. Dated April 19, 1898. This invention relates to railways of that class in which a single line of track is supported at a height above the ground, so that cars may be suspended to travel upon these rails. It consists essentially of a frame-work upon which the track is supported above the surface of the ground, cars mounted in pairs upon opposite sides of the track and frame-work, trucks having wheels journaled at opposite ends adapted to travel upon the rails, transverse timbers centrally swiveled on the trucks extending through the opposite ends and upper part of each car, with hangers supported from these timbers extending downwardly into the cars, so that the weight of the latter is adjustably supported from the hangers. Horizontally journaled rollers are adapted to travel against rails fixed to the posts of the rail supporting frame-work at points in line with these rollers, to prevent too great a swaying of the cars when in rapid motion.

DEVICE FOR FOLDING TOILET PAPER.—Wm. E. Coombs, San Jose, Cal. No. 602,595. Dated April 19, 1898. This invention relates to a device which is adapted to cut continuous sheets of paper into desired lengths, folding the sheets to form packages with alternate sheets overlapping each other from alternate sides. It is especially designed to form packages of toilet paper which are afterwards placed in holders, from which the sheets are removable singly and independently. This paper is brought to the machine in continuous sheets from opposite sides and delivered to a common center, where they are laid alternately, one over the other, cutting the lengths double that of the packages to be formed and folded down, so that each sheet is alternately folded over the opposing one. This is effected by means of an oscillating or vibrating roller suspended from above the central portion of the apparatus, the paper being held by clamps, and by means of vertical movable casings and cutters therein the paper is severed to the proper lengths and afterwards folded by the reciprocating roller.

OIL VAPOR TRACTION ENGINE.—Daniel Best, San Leandro, Cal. No. 602,594. Dated April 19, 1898. This invention relates to an improvement in what are known as "traction engines." The object is to provide a self-propelled engine capable of drawing loads upon the roads, and which is especially adapted to be used in countries where water cannot be obtained in necessary quantities for the use of steam engines. The invention consists essentially of a frame with supporting and driving wheels having two sets of cylinders mounted in pairs thereon, each cylinder having the top and bottom of its open end formed with longitudinal slots or channels, cross-heads projecting from the pistons, slidable in the slots, and detachable connecting rods uniting the cross-heads, so that the cylinders of each pair may be used together or the rearmost piston disengaged, and only one pair be employed for light loads. Connections are made between the pistons and a crank shaft and intermediate gearing between the crank shaft and the driving wheels serve to transmit power thereto. A vertically disposed carburetor is connected with the adjacent ends of the cylinders, so that oil or other hydrocarbon vapor may be employed explosively in the engine cylinders, thus avoiding the use of a steam boiler, with its added weight and the water necessary for its operation. In order to keep the cylinders sufficiently cool, it is necessary to circulate water about them, and this water is conveyed through a cistern of pipes so as to be exposed to the atmosphere and its temperature reduced after each passage over and around the cylinders, thus maintaining the same body of water without any essential advantages. The gear is so arranged that different rates of speed may be produced and the apparatus very readily reversed to run in the opposite direction.

CAR COUPLING.—R. H. McCaughey, Cambbell, Cal. No. 602,605. Dated April 19, 1898. This invention relates to improvements in apparatus for coupling cars, and it consists essentially of draw bars, fulcrumed and movable to or from each other in a horizontal plane, the bars having diagonally disposed meeting faces, so that the heads are separated to pass each other when they come in contact. The rear of these heads has hook-shaped projections which interlock when the bars are again brought into line after the heads have passed each other, and by means of weighted bell crank levers the draw bars are normally retained in the position of engagement. Suitable devices are connected with the draw bars to pull them apart, to allow the heads to disengage and pass each other when it is desired to uncouple the cars. The weights serve to return the parts to their normal position whenever they are released.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING APRIL 19, 1898.

602,796.—WAVE MOTOR—H. R. Alden, Portland, Ogn.
602,503.—MATCH IGNITER—Axelson & Gunn, Los Angeles, Cal.
602,594.—TRACTION ENGINE—D. Best, San Leandro, Cal.
602,798.—BALLOT BOX—H. Braasch, Los Angeles, Cal.
602,694.—ROPE CLAMP—A. R. Bradeen, Seattle, Wash.
602,496.—TRUNK HARNESS—H. Brunner, Jr., S. F.
602,505.—FOLDING TOILET PAPER—W. E. Coombs, San Jose, Cal.
602,698.—RAISIN SEEDER—C. S. Cox, Fresno, Cal.
602,735.—PUZZLE—F. H. Donaldson, Garvanza, Cal.
602,657.—STEAM TRAP—C. R. Franklin, S. F.
602,601.—SINGLE-TRACK RAILWAY AND CAR—J. Hopkirk, Oakland, Cal.
602,561.—KEY—B. J. Loomis, Los Angeles, Cal.
602,605.—CAR COUPLING—R. H. McCaughey, Campbell, Cal.
602,794.—ENGINE—J. Porritt, S. F.
602,795.—PRESERVING EGGS—F. C. Smith, Los Angeles, Cal.
602,492.—PUMP—C. G. White, Woodland, Cal.
602,811.—BOTTLE—G. H. Williams, Los Angeles, Cal.
602,548.—GAS REGULATOR—Williams & Seiler, S. F.
28,485.—DESIGN—LUNCH BUCKET TOP—W. M. Robertson, S. F.
28,492.—DESIGN—BATTERY ELECTRODE—Taylor & Bergman, Spokane, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Recent California Mining Incorporations.

Iron Chief G. M. Co., Los Angeles; capital stock, $250,000; subscribed $50; L. W. Shinn, R. M. Strauss, R. B. Stephens, H. J. Fleishman, H. Vander Leck.

Pacific M. & I. Co., San Francisco; capital stock, $100,000; subscribed $50; B. M. Perry, G. M. Keller, J. H. Bernard, B. H. Wedmeyer.

Vina G. M. Co., San Francisco; capital stock, $100,000; subscribed $50; P. Marsicano, M. O'Brien, E. Lastreto, P. H. Conaid, F. Stelcher.

Desert Queen G. M. & M. Co., San Jose; R. M. McCabe, L. Montgomery, A. G. Rifenburg, J. L. Asay, J. R. Chace, W. R. Potter, W. C. Morton.

Recently Declared Mining Dividends.

Parrot, Montana, 3 cents per share, $69,000; April 14.

Iron Mountain, Montana, 2 cents per share, $10,000; payable immediately.

Mammoth, Utah, ½ cent per share, $20,000; payable May 2.

Lillie, Colorado, 3 cents per share, $27,000; payable May 2.

Vindicator, Colorado, 2½ cents per share, $37,500; payable immediately.

Moon-Anchor, Colorado, 2½ cents per share, $15,000; payable May 2.

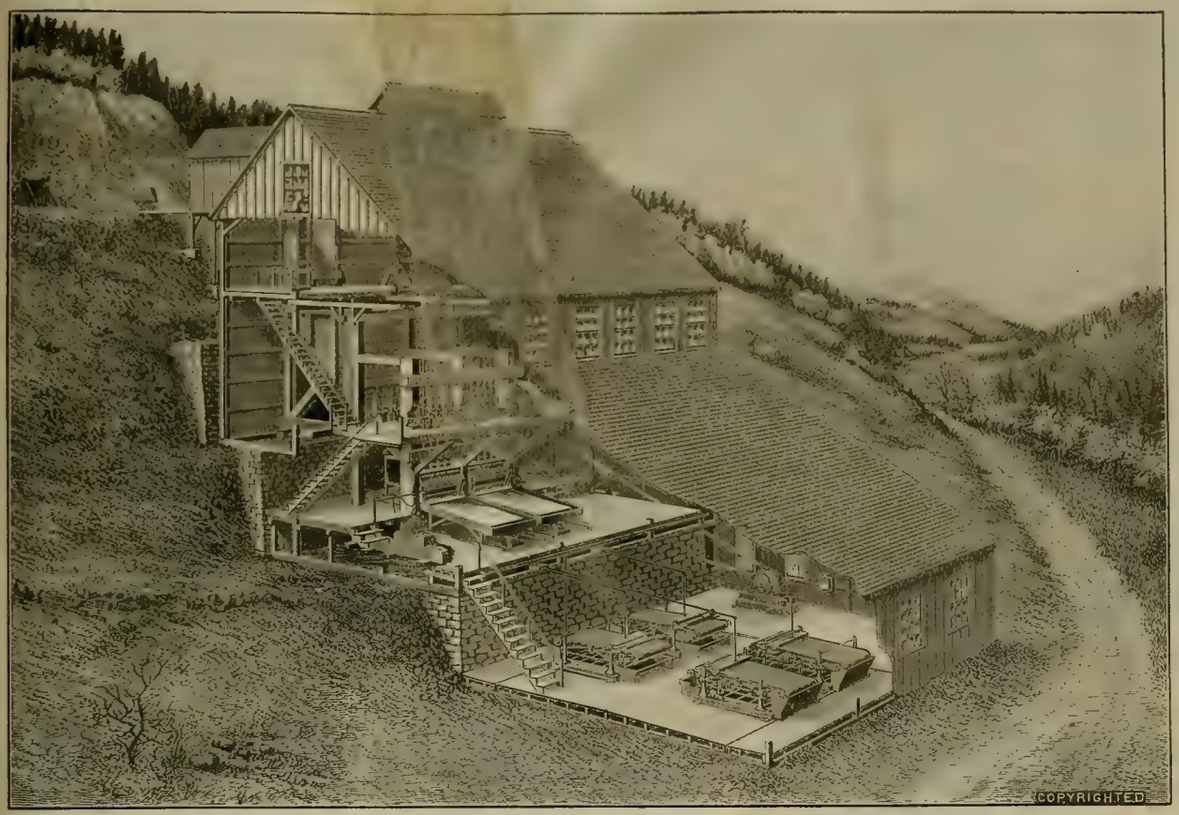
Geyser-Marion, Utah, 2 cents per share, $6000; payable May 2.

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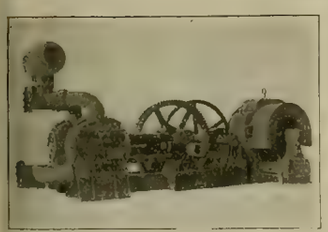


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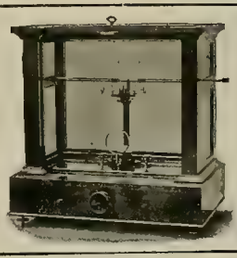


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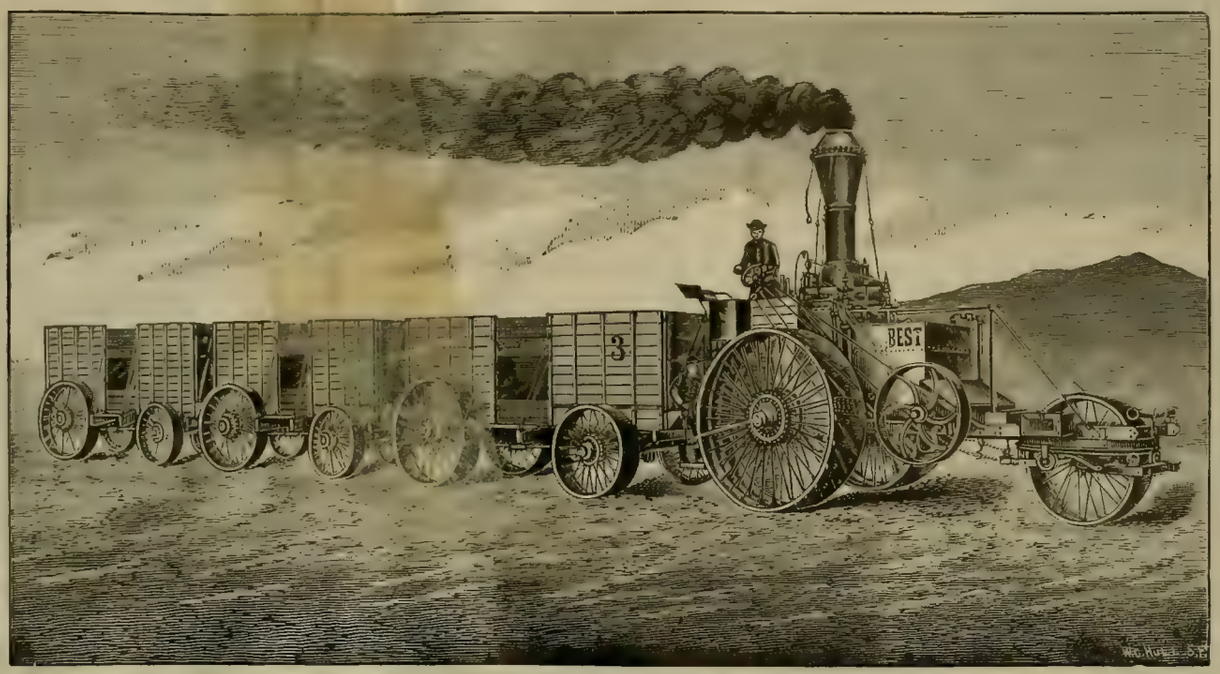
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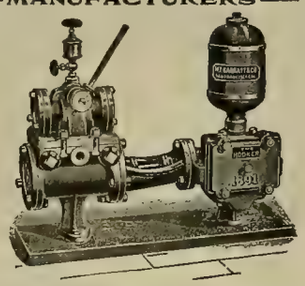
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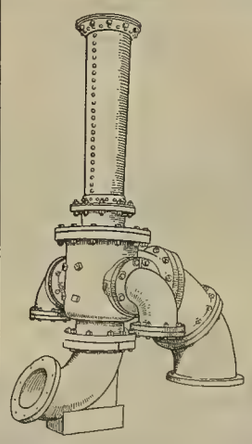
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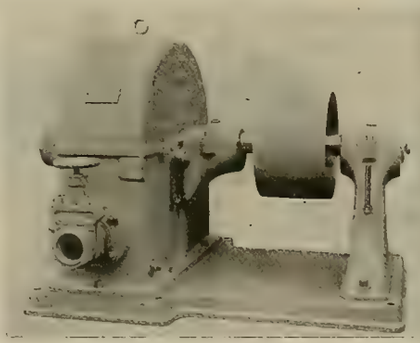
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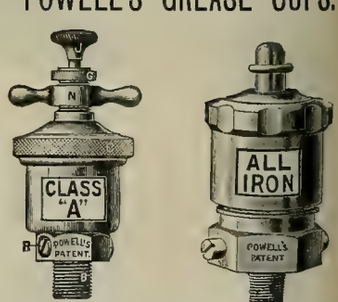
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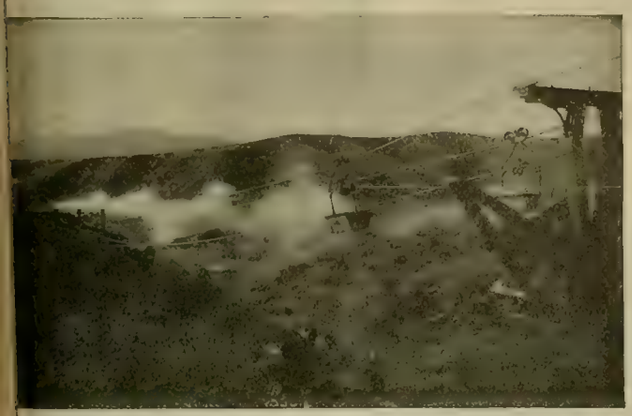
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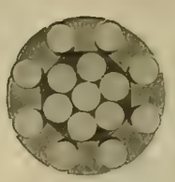
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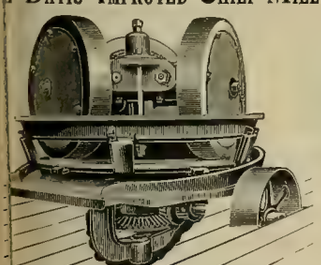
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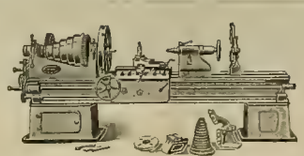
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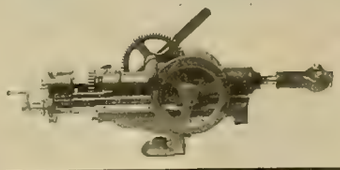


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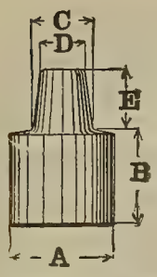
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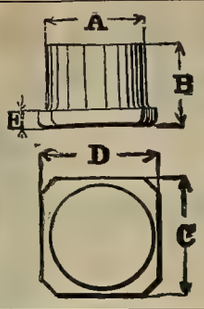
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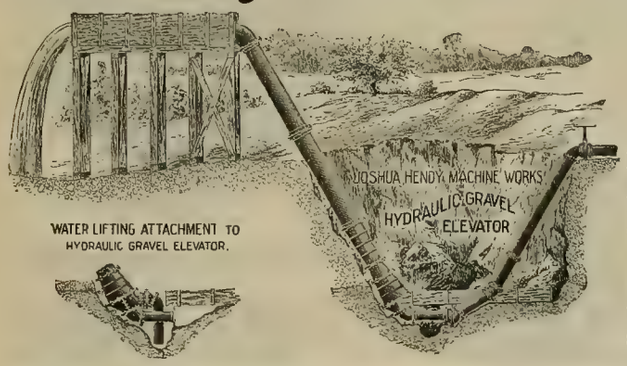
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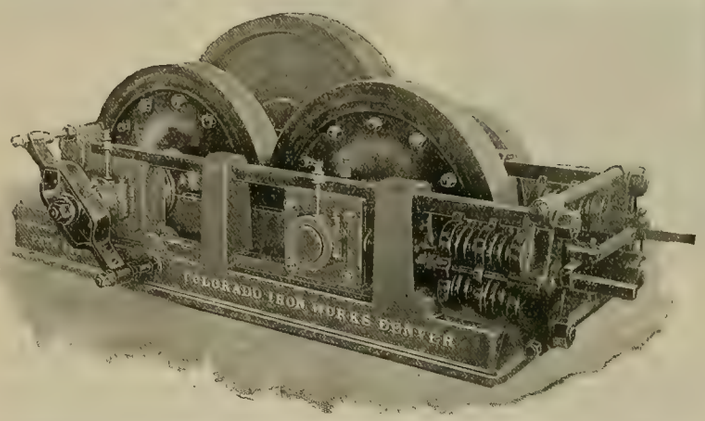
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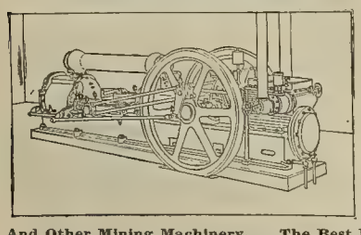
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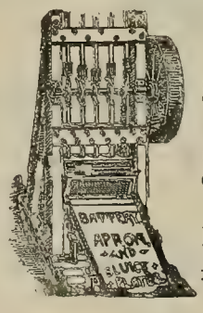
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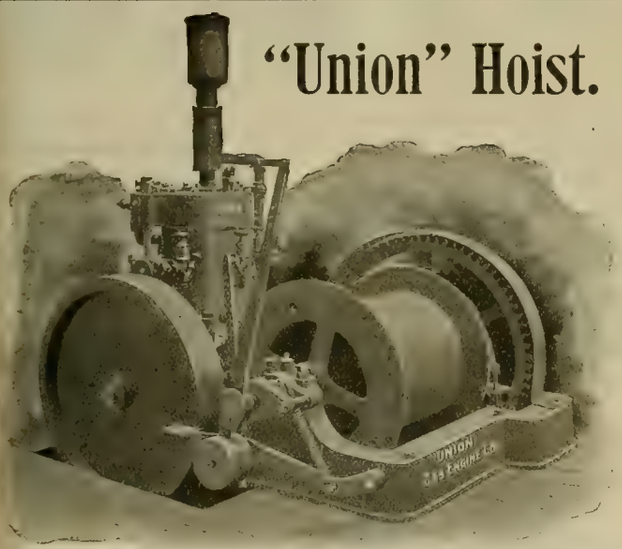
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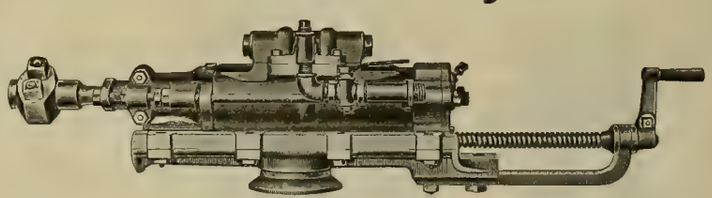
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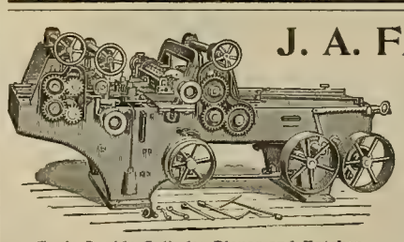


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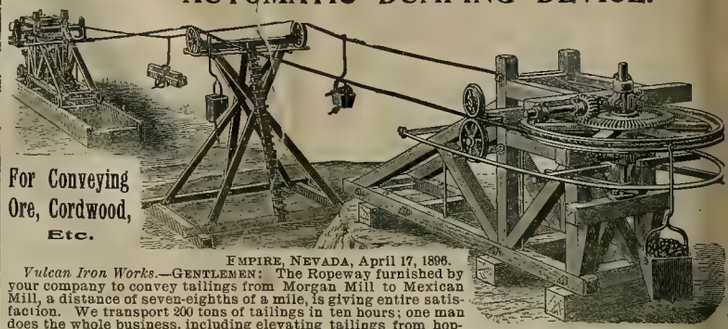
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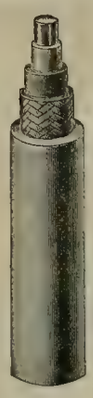
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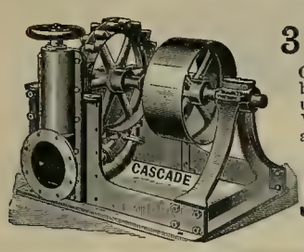
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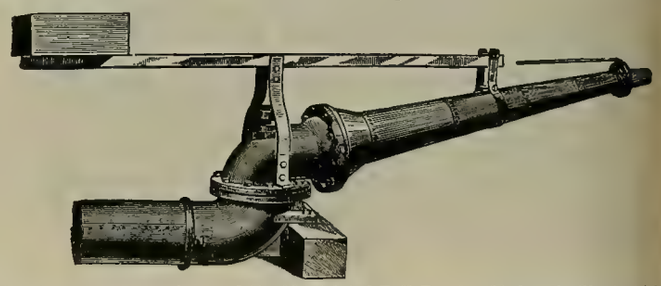
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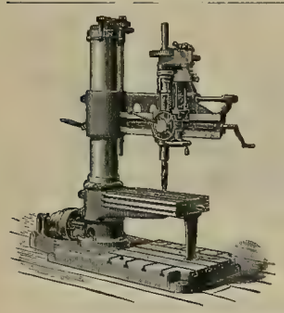


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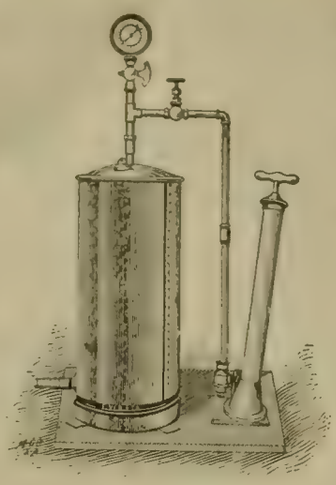
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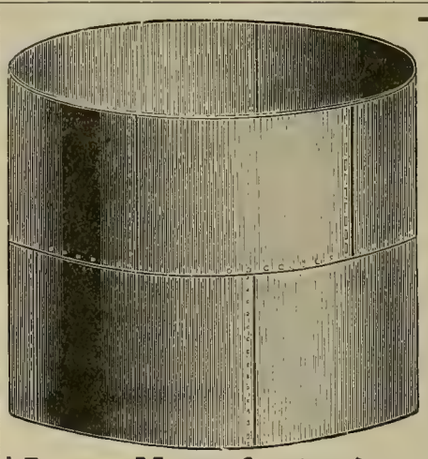
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Market Reports.

The Markets.

SAN FRANCISCO, April 28, 1898.

Actual commencement of hostilities has cleared the air of vapory imaginings, and last week's flurry in local holdings is over. As here, so in the East, staples are higher, industrials have receded, and though in some lines trade is dull, the markets throughout keep up. New York City reports money on call steady, 1½@2½ per cent; prime mercantile paper, 6@7 per cent. Sterling exchange steady, with actual business in bankers' bills at $4.84¾@4.85 for demand at $4.81¼ for sixty days. Silver certificates, 57¼. Mexican dollars, 45¼c. Bar silver, 57c.

PIG IRON.—Firmer, with $6.70 bid and $7 asked.

LAKE COPPER.—Unchanged; $12.10 bid, $12.25 asked.

TIN.—$14.50 bid.

SPELTER.—Easier; $4.10 bid, and $4.20 asked.

LEAD.—Firmer, with $3.70 bid and $3.75 asked. The firm fixing the settling price for leading Western miners and smelters quotes lead at $3.50.

SILVER.—London quotes silver at 26¼d; San Francisco, 56¼c.

COAL.—San Francisco cargo lots: Wellington, $8 per ton; New Wellington, $8; Southfield Wellington, $7.50; Seattle, $6; Bryant, $6; Coos Bay, $5.50; Wallsend, $7.50; Scotch, $10; Cumberland, $10.25 in bulk and $11.50 in sacks; Pennsylvania Anthracite Egg, $14; Cannel, $10; Rock Springs, Castle Gate and Pleasant Valley, $9; Coke, $12 per ton in bulk and $14 in sacks.

In answer to inquiry the following is given as the latest United States official valuation of certain foreign coins and currencies:

Bolivia, silver boliviano	.30.42.4
Central America, silver peso	.41.4
China, Canton tael	.68.3
" Tientsin tael	.66.4
Colombia, silver peso	.42.4
Ecuador, silver peso	.42.4
India, silver rupee	.20.1
Mexico, silver dollar	.46
Persia, silver kran	.07.8
Peru, silver sol	.42.4

Mining Share Market.

SAN FRANCISCO, April 28, 1898.

The Comstocks and other mining shares had a dull week of it. Alta and Hale & Norcross kept up pretty well. Good reports were received from Con. California & Virginia, Sierra Nevada and Occidental Con., though the latter drooped. On Wednesday there was a slight advance all through, Sierra Nevada selling up to 74. On the Brunswick lode the main north drift, 600 level, was advanced 10 feet; total length, 484 feet. This drift is following the foot wall, on which is a streak of quartz from 5 to 8 inches wide, assaying from $2 to $3.50 per ton. Incline shaft No. 1 has been sunk a distance of 3 feet; total depth, 1194 feet; bottom in porphyry.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 28, 1898.

9:30 A. M. SESSION.

100	Alpha	02	900	H. & N.	50
250	Belcher	09	500	Overman	02
200	Best & Belcher	27	200	Sierra Nevada	68
250	Con Cal & Va	58	200	Utah	07
200	Gould & Curry	20			

SECOND SESSION—2:30 P. M.

150	Ophir	40	200	H. & N.	52
200	Mexican	12	300	Yellow Jacket	09
250	Gould & Curry	21	200	Belcher	14
200	Best & Belcher	29	600	Sierra Nevada	69
150	Con Cal & Va	61	100	Utah	07
700	Savage	15	300	Union	15
400	Potosi	23	400	Challenge	15

NOTICE OF ANNUAL MEETING.

JAMISON MINING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California; works, on Jamison Creek, near Johnsville, Plumas County, California.

In accordance with the by-laws of said company, the annual meeting of the stockholders of the Jamison Mining Company will be held at the office of the company, rooms 50 and 54, 120 Sutter Street, San Francisco, California, at 2 P. M., on MONDAY, the 2nd day of May, 1898.

SAM. W. CHEYNEY, Secretary.

Dated March 11th, 1898.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Geo. C. Rose, in the Blue Rock Mine at Georgia Slide, El Dorado Co., to deposit tailings behind the dam of the Gold Bug Mine in Canyon Creek; from A. B. Driesbach and J. F. Dudley, in the Driesbach & Dudley Mine near North San Juan, Nevada Co., to deposit tailings in Shady Creek; from Wm. E. Moore and John Isbister, in the Fair View Mine at Sweetland, Nevada Co., to deposit tailings on a flat below the mine; and from David Cabona and John Romano, in the Imperial Mine near Sierra City, Sierra Co., to deposit tailings in old pits below the mine, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on May 16, 1898, at 1:30 P. M.

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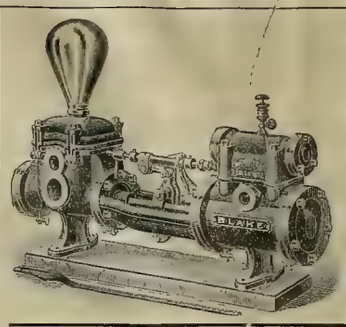
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Third edition; Just Out. Rewritten and Improved by the Author, C. H. Aaron. Embraces 130 12-mo pages, with illustrations; well bound in cloth; 1896. Price, postpaid. $1 00

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"Machinists' and Engineers' Pocket Manual:" J. B. Dixon; pp. 371, illustrated; rules and solved problems regarding steam engines, steam boilers, steam pumps, etc., and data of value in the machine shop; Laird & Lee, Chicago; $1.

"The Resistance and Propulsion of Ships:" W. F. Durand; 8vo; pp. 461; 116 illustrations; a fine book of unusual value and great present interest, being a clear, intelligent presentation of the entire subject from the scientific standpoint of the modern engineer. Even to those not intimately connected with the matter, the book commends itself as a means of practical information; Jno. Wiley & Sons, N. Y. City; $5.

"Hydraulic and Placer Mining:" E. B. Wilson; 8vo; pp. 234, profusely illustrated. In the preface to his work, the author says: "The present activity in placer mining arises from the unprecedented demand for gold. Simultaneously with this demand new sources of supply are discovered, and obstacles which, in California at least, temporarily prevented placer mining have been satisfactorily surmounted. New and improved machinery has been introduced, which admits a wider range of such deposits being exploited. The author here acknowledges the kindness of the Risdon Iron Company and the MINING AND SCIENTIFIC PRESS of California, also the *Scientific American* of New York, for illustrations which appear in this book. He is also indebted for information to the manufacturers whose names are inserted. The method of presenting the subject matter, he trusts, will be of substantial benefit to those interested in placer mining."

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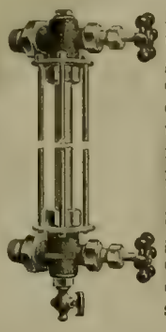
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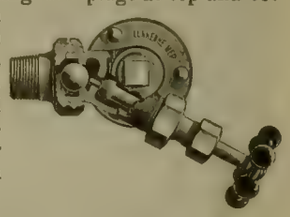
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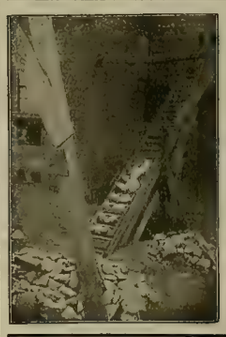


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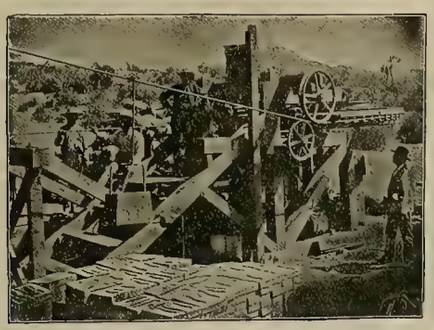
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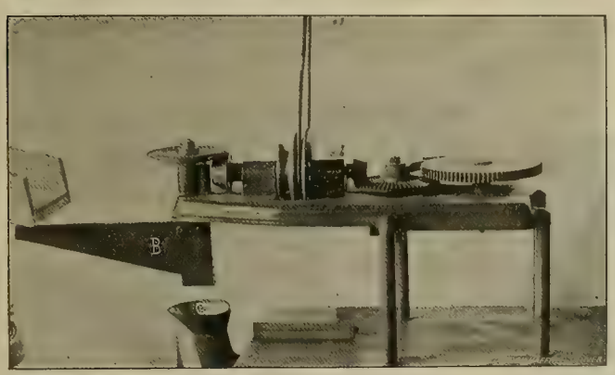
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AND PACIFIC ELECTRICAL REVIEW.

No. 1974.—VOLUME LXXVI. Number 19. SAN FRANCISCO, SATURDAY, MAY 7, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A Submarine Torpedo Boat.

The reduction of Matanzas, Cuba, by the American fleet in command of Rear-Admiral Sampson, demonstrates the skill of the American gunners, and, as the first naval action in Atlantic waters for thirty-three years, attracts world-wide interest. In connection with naval movements the question of submarine torpedo boats is of present interest. As pointed out by Capt. Jaques in an address before the Institute of Naval Architects on the 1st ult., the generally accepted type of torpedo boats is one which has not come to stay; there is evidence enough in the results that obtained in the late Japan-China war, in the discomfort of life on board, in the accidents incident to maneuvering, their unfitness for serious work at sea, the great fatigue to which the crews are subjected, and the marked strides in torpedo-boat construction to reach speed, protection and a reasonable defensive power to convince us that the present torpedo craft, whether she be carried on a battleship or as a torpedo-boat destroyer, is neither sufficiently protected nor invisible, nor can she keep the seas without ruining her personnel or meeting destruction.

The torpedo-boat experience gained in the Japan-China war demonstrated the fact that the ordinary torpedo boat had more defects than enduring or re-

(Continued on page 489.)

SUBMERGING TORPEDO BOATS.

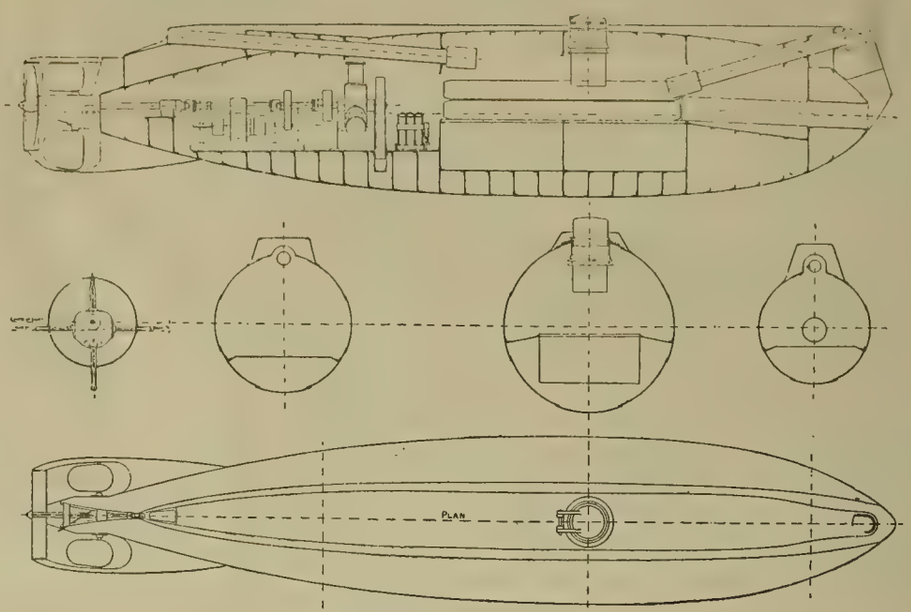


FIG. 1.—HOLLAND TORPEDO BOAT.

ARMORED SUBMERGING TORPEDO BOATS.

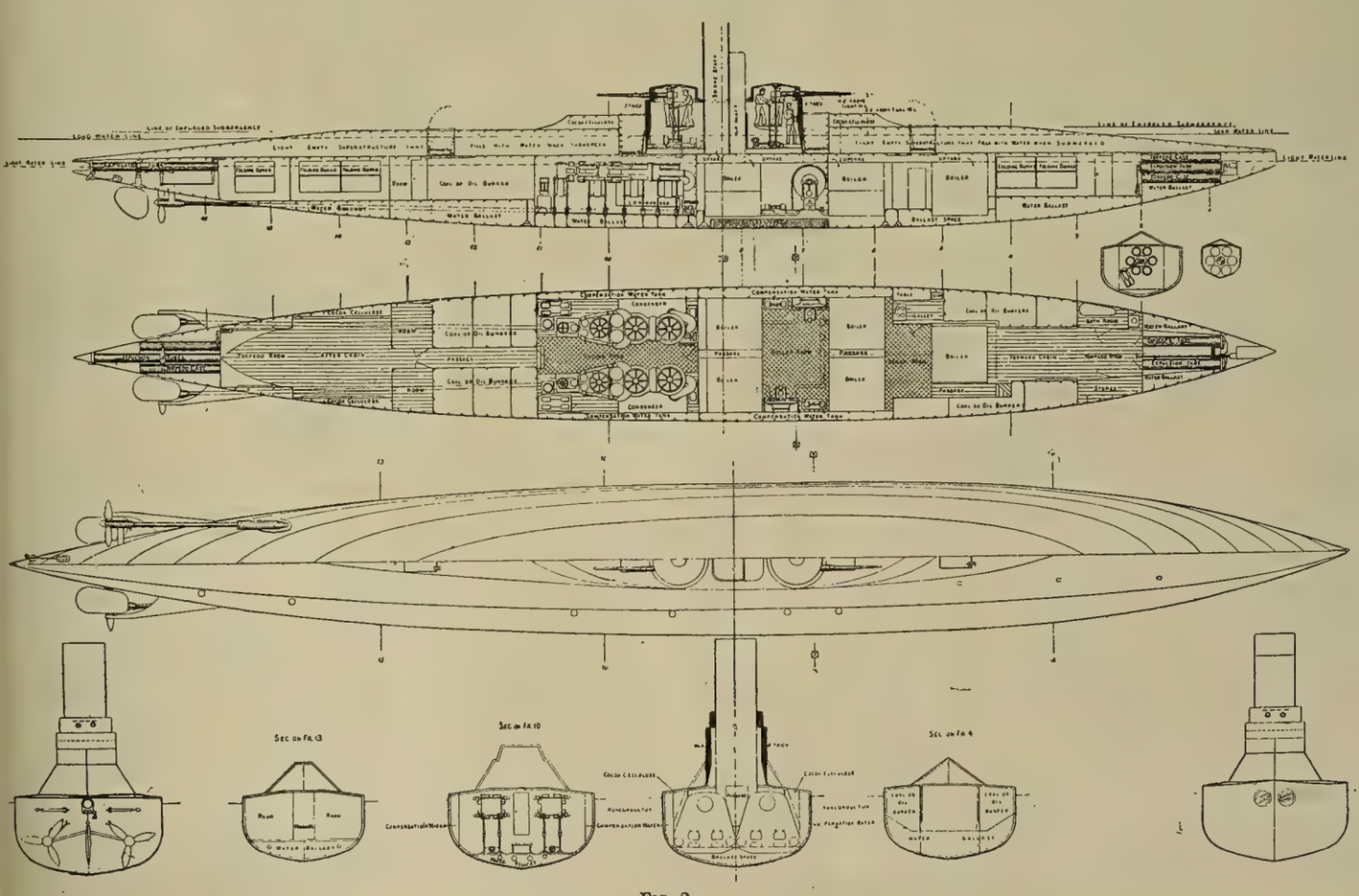


FIG. 2.

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J. F. HALLORAN.....Publisher

San Francisco, May 7, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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"LUMBER," in a recent issue, says:

The timber wealth of the United States gives a yearly product of over $1,000,000,000, or twice the value of the entire output of all the mines together—gold, silver, coal, lead, iron, copper and zinc.

Without decrying the extent or value of the timber business, it is in order to note the inaccuracy of "Lumber's" figures. The value of the mineral output of the United States for '97 was, approximately, $800,000,000.

THE great force of the water issuing from the nozzle of a monitor used in hydraulicking was fearfully illustrated in Placer Co., Cal., last week. T. H. Hobson, while piping at the Horseshoe Bar mine, on the American river, below Michigan Bluff, lost control of the monitor and was thrown some distance. He attempted to rise and the stream of water struck him in the back, killing him instantly. He was a son of J. B. Hobson, at present managing the Horsefly mine, Cariboo, B. C.

UNRESTRAINED by telegrams or red tape, Commodore Dewey, with his American squadron, forced the Manila defences last Sunday, fought the forts and fleet, silencing the former and annihilating the latter. Seen or unseen, the signal flashed along the fleet was doubtless "Remember the Maine." American courage and science went up against superstitious tradition, and the first great sea fight since our civil war showed the prowess of the American navy and "the man behind the gun."

ON the first of next month the Transmississippi and International Exposition opens in Omaha, Neb. The Governor of California has appointed M. H. De Young Commissioner-General of this State; the Commissioners in charge of the exhibit are Messrs. Wooster, McMurray, Mills, Johnson, Ford and Easton. The Commission has held one meeting and has agreed that the time is short to raise the $10,000 required to secure appropriate representation. It was further agreed that, if practicable, the State Mining Bureau's collection should be sent to Omaha; and likewise the State horticultural exhibit. It is a matter of regret that our esteemed Governor was unable to appoint the Commission a little earlier in the year.

THE new U. S. Surveyor General, Gleaves, who succeeds W. S. Green, has taken office in San Francisco. He immediately put deputies at work on mining claims awaiting action, so that they might be passed on by the Land Office and speedily finish the work. Mining claims hereafter will be promptly acted on by the Surveyor General. "The miners are entitled to good treatment by this office," he says. "The greater part of the revenue of this department comes from the miners, and if it were not for them this office might be considered unnecessary. Nevertheless, their claims have not been acted on here for six months, sometimes. My purpose is to dispose of each claim without delay when it is presented, and the miners will have to wait only a few days instead of several months, as formerly."

An Important Meeting.

In sixty days the International Mining Congress will hold its second annual meeting at Salt Lake City, Utah. It is important, for a variety of reasons, that California be appropriately represented; this is a matter upon which all seem to be agreed, though for some unexplained reason the names of the delegates from California have not yet been announced. Secretary Johnson reports that so far he has the names of about three hundred appointed delegates, coming from seventeen States, from Florida to Oregon. The deliberations of this Congress will be important to the mining industry in this west half of America, and California should be properly represented. The scope and character of the topics discussed by this body are best indicated by the following, which were among the questions discussed at the first meeting, which was held in Denver last July: The demand for a Federal Secretary of Mines and Mining; Federal and State legislation as affecting mines and mining; Federal and State statistics of mines and mining; Gold mining a safe proposition, gold value being established by law; The relation of gold and silver in mining the precious metals; Does gold and silver production keep pace with the increase of population and the demands of commerce? Can enough gold be mined to safely make it the only redemption metal money? The opening of Indian lands that have mineral deposits; Mineral lands and their development offer opportunity; Are the timber reservations and Federal reserves injurious to the development of mining? Progress made by science and improved methods of saving the precious metals in the past twenty-five years; Hydraulic and placer mining; Does the known area and gold deposits of placers offer opportunity for profitable development? Railroad transportation and improvement of county wagon roads necessary for the increase and development of mining.

Some Comparative Figures.

In last week's issue appeared the official figures of California's gold yield by counties for 1897, as compiled by Mr. Chas. G. Yale, statistician to the U. S. mint at San Francisco, with some comparative comment.

Through the further courtesy of Mr. N. C. Ray, of Coulterville, Cal., the following table is presented, which graphically shows the per cent of increase and decrease in each county's product as compared with '96, the rank of the several counties as gold producers for the two years, etc.:

GOLD PRODUCTION OF CALIFORNIA, 1897 AND 1896.

COUNTY.	1897.	1896.	Increase.		Decrease.		Rank.	
			Am't.	%	Am't.	%	1897	1896
Alpine	.....	$400	.....	.....	$400	100.00	....	33
Amador	$1,324,493	1,523,351	.....	.....	198,878	13.10	5	4
Butte	667,025	749,316	.....	.....	82,291	10.90	10	11
Calaveras	1,439,861	1,546,399	.....	.....	106,538	6.90	4	3
Del Norte	16,710	24,150	.....	.....	7,440	30.80	28	27
El Dorado	674,626	812,289	.....	.....	137,663	16.90	9	8
Fresno	43,144	28,235	$14,909	52.80	.....	.....	25	26
Humboldt	94,992	65,093	29,899	45.90	.....	.....	21	23
Inyo	159,840	238,507	.....	.....	78,667	33.00	17	18
Kern	754,313	590,867	163,446	27.70	.....	.....	8	12
Lassen	49,100	40,300	8,800	21.80	.....	.....	24	24
L Angeles	40,698	35,468	5,230	14.70	.....	.....	26	25
Madera	85,963	104,340	.....	.....	18,377	17.60	23	21
Mariposa	451,427	335,637	115,790	34 .50	.....	.....	14	16
Merced	.....	1,250	.....	.....	1,250	100.00	..	32
Mono	520,101	451,554	68,547	15.20	.....	.....	13	15
Nevada	1,885,251	2,380,756	.....	.....	495,505	20.80	1	1
Placer	1,524,941	1,674,844	.....	.....	149,903	9.00	3	2
Plumas	339,252	462,527	.....	.....	123,275	26.60	16	14
Riverside	147,227	262,800	.....	.....	115,573	44 00	18	17
Sacram'to	93,050	133,050	.....	.....	40,000	30.00	22	20
S Bern'no	100,373	96,723	3,650	3.80	.....	.....	20	22
San Diego	592,328	560,578	31,750	5.70	.....	.....	11	13
S.L.Ob'po	2.500	3,000	.....	.....	500	16.70	31	31
S.Barba'a	3,000	8,592	.....	.....	5,592	65.00	30	30
Shasta	569,071	599,210	.....	.....	30,139	5.00	12	11
Sierra	370,308	786,175	.....	.....	415,967	52.90	15	9
Siskiyou	842,123	1,091,265	.....	.....	249,142	22 80	7	6
Stanisla's	37,392	16,635	20,757	124.80	.....	.....	27	29
Trinity	1,078,372	1,296,330	.....	.....	217,958	16.80	6	5
Tulare	12,830	20,092	.....	.....	7 262	36.10	29	28
Tuolumne	1,809,572	1,070,142	739,430	69.10	.....	.....	2	7
Yuba	141,638	171,688	.....	.....	30,050	17.50	19	19
			1,202,208		2,512,370			
Total	$15,871,401	$17,181,563			1,310,162	7.60		

Caminetti Act Constitutional.

The most important mining event of the week, though a foregone conclusion, was the decision of the United States Circuit Court of Appeals in the case of the North Bloomfield Gravel Mining Co. against the United States, in which Judge Hawley, who rendered the decision of the court, said that the question to be decided was whether the Act of Congress of March 1st, 1893, was mandatory or not. He held that the law was mandatory, that the United States Congress had power to make such a law, and that the North Bloomfield Co. would be obliged, if it operated its hydraulic mine, to secure a permit from the California Debris Commission. The history of the case is doubtless familiar to most of our readers.

Judge Ross, in the United States Circuit Court, last June held that the Caminetti Act was constitutional. The action was to enjoin the North Bloomfield Company from carrying on hydraulic mining until it complied with the requirements of the Caminetti Act. The complaint set forth that the company had failed to ask of the California Debris Commission a permit to carry on hydraulic mining, and that proper provision had not been taken to prevent the debris from being carried into the navigable streams below.

The defendants denied that debris from their mines impeded navigation and attacked the constitutionality of the Caminetti Act.

Judge Ross upheld the constitutionality of the Act and the right of the Commission to regulate hydraulic mining. In concluding his decision, he used the following language:

So here Congress has created a commission under the direction of the Secretary of War and the supervision of the chief engineers of the army to ascertain whether the various hydraulic mines within the territory drained by the Sacramento and San Joaquin river systems can be operated by impounding and other reservoirs without injury to those navigable waters; and if so the Act of Congress permits them to be operated in such a prescribed way as will prevent any such injury. Until the matters of fact committed to the commission have been ascertained and the extent and methods of the work are prescribed, the Act of Congress prohibits the operation of any mine by the hydraulic process within the territory drained by the Sacramento and San Joaquin river systems from which any debris matter flows into those waters.

This, in my opinion, is the true construction of the Act, and to it as thus construed I see no constitutional objection. It is too late now for any one to question the power on the part of Congress to declare that debris of any character, or other thing, constitutes an obstruction to the navigable waters within its control and to prohibit the use of such waters or other thing. The power to prevent absolutely the use of such waters for the objectionable purposes necessarily includes the power to prescribe the terms and conditions upon which they may be so used.

The provision of Section 10 of the Act, requiring the surrender to the United States of the right to regulate the manner in which the debris resulting from the working of such mine or mines shall be restrained and what amount shall be produced therefrom, only constitutes one of the conditions to such use required by Congress. As Congress already had that power of regulation it needed no conveyance from the mine owner to vest it. For this reason the insertion of that requirement by Congress as a condition to the granting of a patent to mine by the hydraulic process does not render the Act obnoxious to any of the objections urged against it. A decree will be entered for the complainant as prayed for.

The Court of Appeal, in upholding the above decision this week, went into the subject at considerable length, and among other things said:

The references already made and the provisions quoted clearly show that the Act of Congress means just what it says. When it declares that certain things must be done before any permit is given, it means that they shall be done. And if these things are not done, as therein provided, no permit can be issued; and if none is procured, the working of the mine by the hydraulic process is prohibited and made unlawful. The language and terms of the Act when viewed in the light of the history of the times and all the surrounding conditions are clear, certain, positive and mandatory. Any other view would unquestionably lead to absurd results, which all courts declare should be avoided in the construction of any statute. There would be no positive protection either to the miners, farmers or the Government; litigation and strife, which it was the object of the statute to avoid, would continue to reign supreme.

Under the law mine owners engaged in hydraulic mining have no right to use the streams without the permission of the commissioners appointed under the

provisions of the Act. In other words, the Act of Congress, of itself, prohibits all hydraulic mining unless its terms are first complied with. The whole case is virtually disposed of in the conclusions already reached—that the Act is mandatory and constitutional.

The navigable rivers being the property of the nation, it follows that any injury to them which affects the commerce of the country is an injury to property rights, and the mere fact that penalties are imposed upon all parties found guilty of violating any of the provisions of the Act does not of itself prevent the issuance of an injunction to protect the property rights of the Government in the rivers. Wherever commerce among the States goes, the power of the nation, as represented by the courts of the United States, goes with it to protect and enforce its rights.

Under the provisions of the Act, hydraulic mining in the territory named is prohibited unless the terms and conditions which it imposes are complied with. If these provisions are detrimental and injurious instead of beneficial to the mining interests which it was intended to foster, encourage and protect, the efforts of all those interested in that particular business should be directed to have it repealed or amended instead of attempting to evade it or destroy its efficacy. While it remains the law on this subject, it must be obeyed.

Sulphur in California.

In the issue of April 16th appeared an article on "Sulphur and Sulphur Products," in which reference to sulphur deposits in California has elicited inquiry from several sources for further information thereon.

Some years ago sulphur was produced in considerable quantity from deposits on and near the eastern shore of Clear lake, Lake county. Works were put up and run for several years, but operations appear to have been unprofitable. The vicinity of Sulphur Banks mine is reported to have furnished for some time the supply of the California market—at that time 700 to 800 tons annually.

The sulphur deposits on the eastern side of the valley, in Kern county, occur principally as superficial deposits covered in many places with drift from the mountains. The deposits in the Sunset oil district cover an area of several acres. Prospect holes show one deposit made up of high and low grade ore, some of it nearly pure sulphur, but for the most part it consists of a drift cemented with sulphur. Similar occurrences are reported in the same region.

Sulphur occurs at various places within this State, but the known localities of its occurrence do not, it is believed, contain important or extensive deposits. Mention is made of this mineral in a number of the various reports of the State Mineralogist. In the eighth report it is said to occur in Mendocino county, also in Lake and Colusa counties. Mention is also made of the occurrences in the same counties in the tenth, eleventh and twelfth reports, and in the eleventh and twelfth reports the occurrence of the mineral in Kern county is described. Some sulphur was at one time shipped from localities along Sulphur creek, Colusa county. In the same county deposits are mentioned near Wilbur springs and at the Elgin mine. In 1891 attempt was made to work the sulphur on the Elgin property, but with little success, and the sulphur produced, although of 88%, was black sulphur, and not acceptable to the California market.

On the 26th ult. the Superior Court of Shasta county, Cal., held that the new mining law of the State of California, which went into effect May 26th, '97, is constitutional. Action was brought to quiet title to the Sprague mine, near Shasta. The plaintiff offered in evidence his notice of location of the property. The location blank was of the form used under the old law and was made of record on December 8th, '97, or twenty days prior to the alleged entry of the defendants upon the property. The plaintiff objected to the admission of the instrument in evidence on the ground that it did not comply with the new law, which was then in full force and effect. The court sustained the objection, thereby holding that the new mining law is constitutional. So far as known this is the first favorable decision thereon and the second time that the matter came up in court, the first being a contrary decision in July, '97, by the Superior Court of Mono county, Cal.

The congressional bill previously noted, providing that owners of mining claims shall not forfeit for failing to perform the assessment work upon them provided they enlist for war, passed the U. S. Senate last Monday.

New Tunnel Site Statute.

The lower house of Congress recently passed the bill introduced by Congressman Bell of Colorado to change the Revised Statutes of the United States relative to tunnel sites. The bill, which has been noticed heretofore herein, was recommended by the Secretary of the Interior and by the Commissioner of the General Land Office. The report of the committee which had the bill in charge was as follows:

A discovery from the surface entitles the miner to 1500 feet in length and 600 feet in width, and also the same area when the discovery is made in a tunnel. Tunnels are usually run at right angles to the general course of the veins. The Supreme Court has held that the tunnel claimant may take his whole claim on either side of the tunnel that he may desire after he cuts the vein, and he is required to give no notice nor to protest against anyone applying for a patent on any ground within 1500 feet of the line of the tunnel. Yet when he cuts a vein in the tunnel he may take his claim all on one side, though it covers ground actually purchased of the Government by others within the 1500 foot limit.

The evil that section of the bill seeks to cure is to confine the rights of the tunnel claimant to 750 feet on each side of the line of the tunnel, should the extension of the claim beyond 750 feet from the line of the tunnel conflict with the rights of any prior locator. If the tunnel claimant does not conflict with any other locator he may, under Section 1 of this bill, take a full claim on one or both sides of the line of the tunnel. As the law now stands the claimant is entitled to only 1500 feet of the vein, but, not being confined to either side or to any portion on one side and the remainder on the other, and having the right to choose his whole claim on either side, or a part on one side and the remainder on the other, renders anyone locating a claim within 1500 feet of the line on either side of the tunnel subject to the will of the tunnel claimant of he cuts the same vein, or in effect severs it, and there are 3000 feet in width out of which he can only extend his lines 1500 feet.

Section 2 simply requires a tunnel claimant to stake his claim at the surface and record the claim within sixty days from the time the vein is cut; otherwise it will be deemed that he has abandoned the same, should any locator discover the same claim outside of the tunnel and locate the same. These lands are sold by the Government to the claimants for $5 per acre, and the interest of the Government, as well as that of the prospectors, requires that there should be no ambiguity about the intention of claimants or as to the specific ground desired.

Section 3 of the bill gives the claimant all ore from the point touched to the surface, even though the apex of the vein may depart from the side lines.

The matter is of considerable local interest in Colorado and of general importance throughout the United States. It is believed that the bill will pass the Senate and become a law practically in the form given above.

In an article in Science, reviewing the progress of geographical work in this country, Marcus Baker of the U. S. Geological Survey shows that twenty years ago a reorganization of the system of national surveying resulted in the present United States Geological Survey, created in March, 1879. It replaced the prior organizations, familiarly known as the Hayden, Powell and Wheeler surveys. The work laid out for the newly-created Geological Survey was geological, and its field the national domain. "What is the national domain? Is it restricted to the Territories and places actually occupied by the United States, or does it embrace every spot where the Stars and Stripes may float? Congress, after a long debate, answered this question and authorized surveys to be made in every part of our whole Union. Again, geological investigations cannot be satisfactorily made, nor geological results satisfactorily exhibited, without maps, topographic maps—i. e., maps which show the shapes and forms, as well as positions on the surface. Such maps did not exist. A fragment here and there, to be sure, existed—a fringe of sea and lake coast; but these constituted only a bare beginning. Accordingly, in 1882, authority was given, and the beginning of the mighty task of making a topographic map of the United States was begun. That work has for sixteen years progressed without interruption, and to-day we have contour topographic maps covering more than 600,000 square miles. In almost every State and Territory in the Union work has been done, while Massachusetts, Connecticut, Rhode Island, New Jersey and the District of Columbia are completely mapped. That the prosecution of this work and the distribution of the maps has profoundly influenced interest in and knowledge of geography in the United States goes without saying. These maps are in the hands of engineers, of projectors of improvements, of teachers, of text-book makers, and of geographic students everywhere. The standards of school geographies have risen, methods of geographic teaching have been changed, and a better understanding of the relations of environment produced. And thus the first century of progress in geography ends with a rate of progress, both in research and teaching, never surpassed. That which has been already accomplished is great; yet it is but a small part of that which remains to be done."

Some Questions Answered.

A Florence, Idaho, subscriber asks: I. Will an *amended* location notice hold a quartz claim, when recorded, where no original location notice is recorded? II. A locates the Bonanza lode, but makes his location across the vein. B makes a discovery inside A's line, but over 400 feet from the Bonanza vein; has B a valid location, viz: does A's end lines become his side lines?

I. A location may be amended at any time, provided intervening rights are not affected. The fact that the original location notice is not recorded will not affect the validity or operative force of the amended notice, provided there are no intervening rights. In such a case the amended notice will take effect as of its date and be considered an original notice.

II. When a locator locates crosswise of his vein, his so-called side lines become end lines. In such a case his true side lines must be constructed with reference to the ascertained course of the vein, i. e., parallel with and not more than 300 feet on each side of the center of the vein. If the width as originally marked is excessive, the excess should be cast off, so that the middle of the vein shall be in the center of the location. The area thus excluded is subject to appropriation. A's discovery in the case illustrated, being within the excluded area, may be made the basis of a valid location. We understand this to be the rule announced in Taylor v. Parmenteau (Colo.), 48 Pac. 505, Bonner v. Meikle, 82 Fed., at page 705, and Lakin v. Dolly, 53 Fed., 333.

An Etna, Cal., reader writes:

I am interested in four unpatented placer claims, equal subdivisions of a parallelogram, each consisting of eight locations of twenty acres—160 acres in each, or a total of 640 acres. First, is each of the four claims considered, under the latest ruling, "a claim" or "a group of claims?" Are the four claims taken together considered by the law as "a group of claims?" There has been expended upon each claim—160 acres—more than the $500 required before patent can be applied for. As it is now too late for me to get a patent before July 1st, '98, must I expend $500 on each of the twenty-acre locations before I can apply for same? Can I get patent for the whole 640 acres in one body or must there be four patents?

A placer location covering 160 acres is considered as one claim by the Land Department. If the four claims are contiguous, it is one claim or group until July 1st, '98; and $500 expenditure is sufficient for patent; after that time each location of 160 acres will be considered by the Land Department as a separate claim in patent proceedings, and $2000 worth of work will be necessary; but all may be patented under one application if adjoining each other either before or after that date. If more than $500 has been expended on each claim, that is all that is necessary under rule 53. It is assumed that the questioner means that eight locations are united in each 160-acre lot, and the foregoing is based upon that assumption. If as a fact they are in thirty-two twenty-acre locations, $500 worth of work will have to be done upon each one after July 1st, '98, to entitle the applicant for patent. It would require a separate application for each lot or location if the same are separate or cannot be joined either before or after that date.

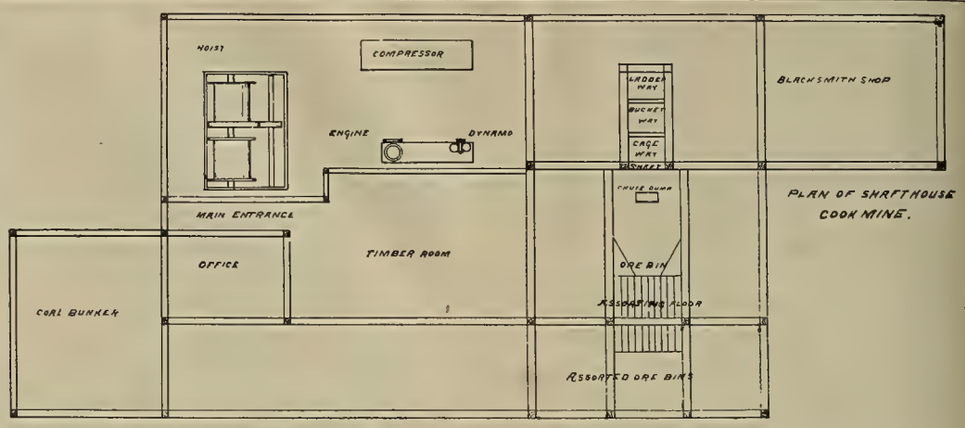
The feasibility of draining the Comstock, Nev., mines, and resuming deep mining therein has been pointed out in several articles in this paper in the last three years. Negotiations looking toward a realization of the idea have been in progress for some time. Plans for pumping are now under consideration, and it is hoped that the work of pumping will shortly be begun in the Yellow Jacket shaft.

Equipment of a Colorado Mine.

Herewith is illustrated the shaft house plans and equipment of the Cook mine at Blackhawk, Gilpin county, Colorado, which property was recently sold to a Boston syndicate by M. P. Dalton of Denver. The property is on Gregory hill and adjoins the Fisk mine, some of whose stockholders are also stockholders in the Cook. The new shaft house and plant of machinery are set over a new three-compartment shaft, consisting of cage, bucket and ladder ways. The plans of the shaft house and arrangement of machinery plant are those of Clarence K. Colvin, M. E., the mine manager.

The machinery, which was furnished by the Hendrie & Bolthoff Manufacturing and Supply Company of Denver, is of the latest and most improved pattern. The two 80 H. P. return, tubular boilers are each 60 inches by 16 feet and are fed by a Knowles duplex boiler-feed pump, which forces water from tanks into which the exhaust steam from the entire plant is delivered. The building and other arrangements contemplate the possible addition of other similar boilers in the future.

The hoisting engine is the Webster, Camp & Lane make, being their combined gear and band friction type, with two drums 5 feet in diameter and 33-inch face, grooved for 1-inch round rope and to hold 3000 feet of same. The cylinders are 14 inches in diameter, with 18-inch stroke. The throttle valve is of an improved design, which enables the operator to stop or start the cage without shock or jar, and the arrangement of the drums is such that they work either independently or simultaneously, permitting the operator to raise with one and lower with the other, or raise or lower with both at the same time, indicators always designating the position of cage or bucket. In this hoist is said to be used for the first time in Colorado a large rawhide pinion with cut steel gear. A similar but smaller pinion of this kind was put in on one of the engines at the Elkton mine by this firm, which proved so satisfactory that its adoption was decided on in this case. The hoist weighs 55,000 pounds and is set on a grout foundation 8 feet deep.



COOK MINE, BLACKHAWK, COLO.

The air compressor is a 16x16 compound Norwalk and supplies air for four 3-inch rock drills and for forges and pneumatic hammer used in swaging and sharpening drills.

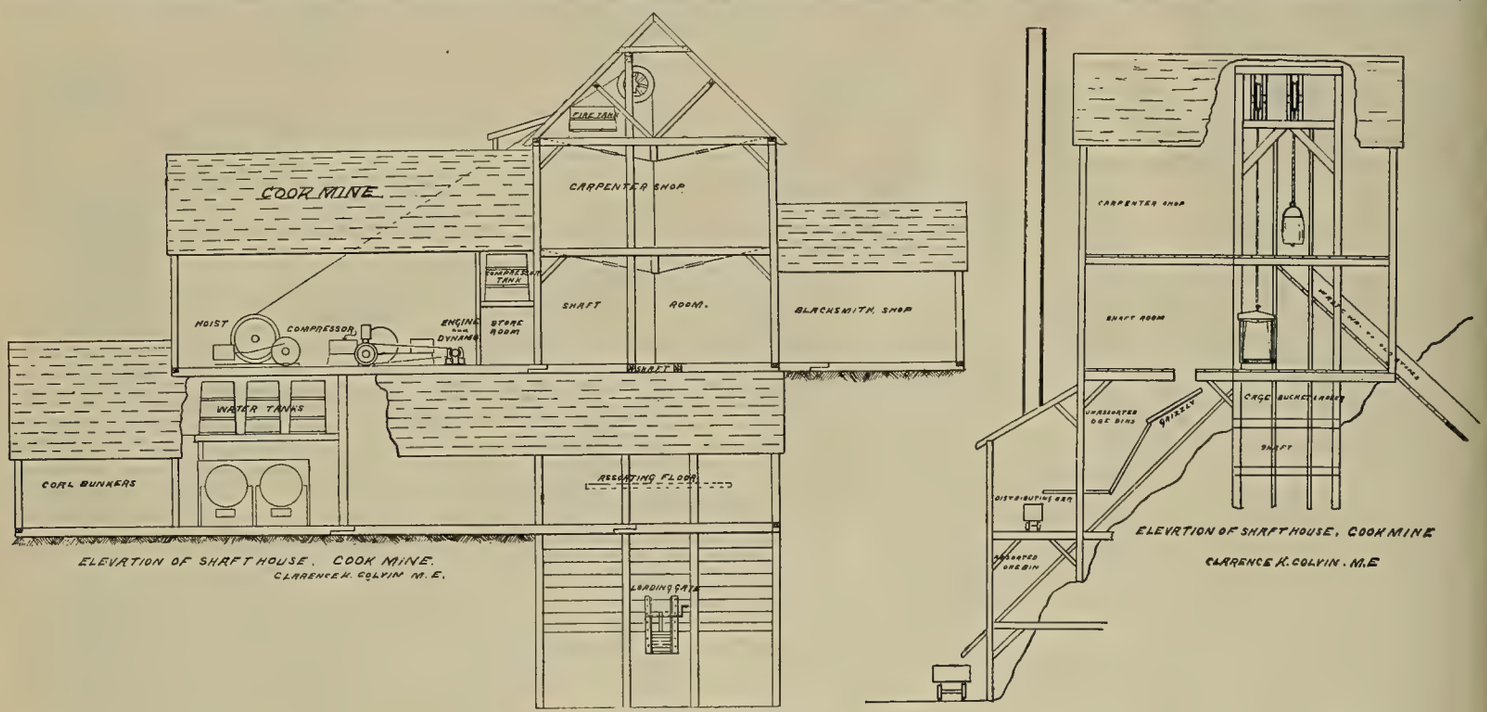
Two air receivers, one at the surface and the other in the mine, supply good, dry air to the drills in drifts and levels.

A high-speed Sturtevant automatic engine is used to operate an electric generator, by which the mine is lighted, and to operate a small timber-framing machine. A new device in the shape of a guide frame keeps the bucket in the center of the shaft.

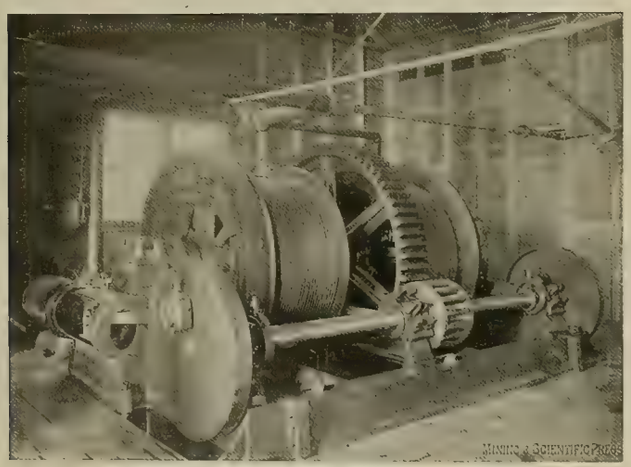
The new shaft above referred to is now at a depth of 150 feet and will be sunk rapidly to the 400-foot and 500-foot levels, which up to this time have been entered and developed through the Fisk shaft. The completion of this shaft will enable the company to work to greater advantage. In the 100-foot level, run from the main shaft a distance of 250 feet, a body of ore from 4 to 6 feet wide has been encountered, from which shipments are being made. On the 500-foot and 600-foot levels are ledges of ore from 6 to 20 feet wide. The ore throughout is an iron and copper sulphide, the principal values being gold and copper. The mill dirt averages in value from three to four ounces per cord, about 50 per cent of which is saved on the plates. The concentrates, reduced to one and a half to three tons per cord, run from $15 to $30 per ton. Approximately 10 per cent of the entire product is smelting ore and runs about $40 per ton. About 80 tons per day are being hoisted, one car per day of which being concentrating and smelting ore.

WASCOTT.

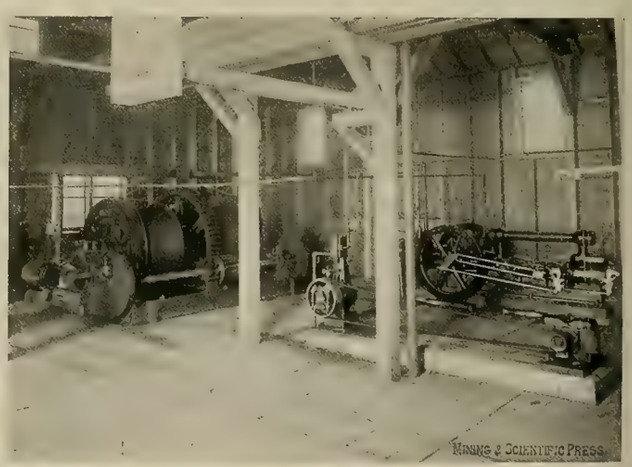
Denver, Colo., April 16th, '98.



COOK MINE, BLACKHAWK, COLO.



HOIST, COOK MINE, BLACKHAWK, COLO.



INTERIOR SHAFT HOUSE, COOK MINE, BLACKHAWK, COLO.

A Submarine Torpedo Boat.

(Continued from page 485.)

liable qualities, and there must be some radical change in the present torpedo-boat architecture.

The desire or attempt to produce a submarine boat for war purposes is not new, nor have the controlling elements of design been restricted to one principle, except in the Holland system.

The leading and most generally accepted principles of the present battleship were taken from the American monitor, a type that for many years was practically discarded, but which during the war of '61-'65 completely, though against the ideas of naval officials, gained such a decisive victory and imposed conditions on subsequent naval architecture that have been universally accepted. If Ericsson's monitor had not had the opportunity of war to prove her value, it is doubtful if she would ever have had such an important place in history or naval architecture. All treatises on torpedo boats, all reports in connection with their construction and supply, all references to their achievements, emphasizes the requisite of invisibility and power to reach an enemy, and to successfully get torpedoes into an enemy's ship.

The development of the submarine boat, its power to disappear, its ability to move quickly, its valuable element of submergence, the practicability of protecting by armor, its limited visible portion, and the surety of its fish-like qualities, must have a radical influence in modifying the present types of torpedo craft, no matter whether it replaces the second-class torpedo boat on board a battleship, whether it is employed for submarine purposes pure and simple, or its submarine principles utilized to protect the semi-submerged torpedo boat and to meet the practical conditions sought for in combining such invisible and protective qualities as will enable the torpedo boat to surely get in her work.

Before describing the two submarine boats, the "Plunger" and the "Holland," now receiving so much attention, a few words about the four boats built under Mr. Holland's direction, and in and with which he made the experiments that made his final success possible.

The first one was built in 1877 by the Albany City Iron Works of New York. Her dimensions were 14½ feet long, 3 feet beam and 2½ feet depth; she had a double body, the inner one being cylindrical; water space between them. She was operated by a 4 H. P. petroleum engine with one screw, and had vertical horizontal rudders.

Mr. Holland experimented with this boat for nine months, and, although her petroleum engines were a failure, and the speed was very unsatisfactory, he proved that he could submerge her at will and keep her under water, and determined that the horizontal rudders were useless when placed in the transverse axis, but effective when at the stern.

After he demonstrated that it was possible to control the boat under water, he had the engines pulled out, and sank it under the Falls bridge at Paterson, N. J., where the hull now lies in the Passaic river.

Boat No. 2 was commenced in 1879 at the Delaware Iron Works, New York City. She was finished and delivered to Mr. Holland in April, 1881; he started experimenting with her immediately, and continuing until October of that year. In that boat he made most of his experiments. She was 31 feet long, 6 feet in diameter, nineteen tons displacement, and was fitted with a 15 H. P. Brayton petroleum engine. With a crew of one engineer and himself he cruised all over the harbor of the North river. Most of his experiments were made under water. As an example of the perfect control of pressure, Mr. Holland relates that, with the boat submerged and resting on a gravel bottom, the engineer opened a bottom manhole, stepped out (without a diving suit), lifted the hull slightly with his hands, and then got in again and closed the manhole.

With her armament of a submarine gun 10 feet 2 inches long and 9-inch bore, he succeeded in getting a perfectly straight projectile trajectory under water for about forty yards. To fire a submarine projectile he used 200 pounds air pressure; the highest was 495 pounds, but it did not appear to make much difference in the range; 250 pounds did nearly as well. The Delamaters built the projectile. This particular pneumatic gun was made of a welded steel tube, and was the foundation for the pneumatic gun system that was afterwards developed under the management of the Pneumatic Dynamite Gun Company. This craft is now lying at New Haven, Connecticut. Her engine is still in her, but the air compressor was taken out about two years ago to run a forge.

Boat No. 3 was built at Ganning's Copper Shop, Jersey City, New Jersey, and was a working model. In her Mr. Holland first employed the apparatus for steering under water in the horizontal plane; he intended to build a gunpowder engine to propel her under water, but, before he accomplished this, she was sunk opposite Whitestone, the engineers, not understanding how to fasten the turret, having left it open about half an inch. A few experiments under water were made before the accident. She was 16 feet 4 inches in length by 28 inches diameter, and of one ton displacement.

Model No. 4 was known as the Zalinski boat, and was built at Fort Lafayette, of composite iron frame, planked with wood; she was 40 feet long, 8 feet diameter, and it was the intention to arm her with large Zalinski pneumatic guns. The launch was mismanaged, the ways broke under her, she fell on the rocks and was seriously damaged. She was repaired sufficiently to carry on experiments at the dock, where she was frequently submerged, and much information secured concerning the control of water ballast. She was finally broken up.

In all these boats Mr. Holland's fundamental principle was to dive, and not to control them, as in the foreign types, either by the inlet, or outlet, of water, or by the down-haul screws alone.

The main things proved by these experiments were: that in submarine boats it was essential to have an unmovable center of gravity; that the movable center was the cause of nearly all the failures; that during the submarine run the weight must remain absolutely unchanged, being kept the same automatically, otherwise she cannot dive when you desire it, or she may run to too great a depth.

Another thing demonstrated was the value of a boat that would be as small as possible, consistent with having sufficient offensive power. It must also be quick-acting, so as to be able to come to the surface and to disappear as rapidly as a porpoise. A cardinal principle governing its design is simplicity.

While there have always been naval officers in the United States who have advocated the value of submarine boats, and the Navy Department has at various periods interested itself in them, the advertisements of November 26th, 1887, and May 1st, 1893, called forth the most important proposals, and a contract was entered into with the Holland Company in 1895.

The one constructed by the Holland Company for the United States Navy Department was named the "Plunger" by the Department, and was launched August 7th of last year at the constructor's yard in Baltimore. She is the fifth one designed by Mr. Holland, and is 84 feet long, of circular section, 11½ feet in diameter, surface displacement 165 tons, with a reserve buoyancy of about a quarter of a ton. The guaranteed speed is fifteen knots on the surface and fourteen knots while awash, with 1 foot of the turret above the water. Her totally submerged electrically running speed must be eight knots for six hours.

There is a turret amidship with 4-inch protection and a superstruction for a fair water. Two down-haul screws have been added, although they are not considered by Mr. Holland a requisite of the system. There are two openings in the nose-piece through which service torpedoes are to be discharged.

In addition to hand-gear for horizontal steering and diving, there are automatic devices for maintaining submergence at predetermined depths. A camera lucida has also been fitted.

The hull has been constructed to admit a submergence of 75 feet. Some of the water-tight compartments serve as water tanks; others contain oil fuel; others are employed for compensating discharged weights. A special device compensates for the oil consumed. There are four rudders, two for steering horizontally and two vertically, controlled by automatic devices.

For running on the surface or awash, steam generated by petroleum is employed, while electricity from storage batteries is used under water. There is one water-tube boiler of the Mosher type of 3000 square feet heating surface, fitted with a system of oil fuel capable of consuming 2000 pounds of oil per hour. There are two main, vertical, triple-expansion steam engines of 600 H. P. each, and one auxiliary of the same type of 300 H. P.

The electric machinery is composed of one main motor of 70 H. P. for propelling the boat when submerged, operating either the side or center shaft, or used as a dynamo for recharging batteries. There are additional electric motors for operating down-haul screws and performing other services as required.

Air for tank and ventilation service is supplied from commercial reservoirs. There are special fittings for closing smoke pipe and air ducts quickly before submerging, and the tank operations are very simply controlled by Kingston and compressed air reducing valves.

The "Plunger" has three propellers (in addition to the down-haul screws), any one or all of which can be operated by either steam or electrical machinery.

Owing to the delays incident to the many modifications of the "Plunger," constructed for the Navy Department at the Baltimore shipyard, the Holland Torpedo Boat Company decided to build a boat into which the essential elements of Mr. Holland's type could be introduced and experimented with by the company, and boat No. 6, the "Holland," was built at the Crescent shipyard, Elizabethport, New Jersey, by Lewis Nixon. Its form resembles that of the porpoise and its dimensions are: Length, 50 feet; diameter, 11 feet; displacement, light, 119 tons; displacement with superstructure awash, 138 tons; displacement, submerged, 139 tons; reserve buoyancy, 0.7 tons.

In this boat no attempt was made to secure a higher speed than was necessary to secure proper diving and steering properties. It was fitted with a 50 H. P. gasoline engine for surface runs, air compression, and storage battery charging, and a 50 H. P. electric motor for submerged work.

Its armament consists of one 18-inch service torpedo tube and two dynamite guns fitted for powder and compressed air discharge.

At a speed of eight knots the "Holland" maneuvers, steers and dives beautifully, and the control of submergence is speedily and easily effected by the operation of Kingston and compressed air reducing valves. Her stability has been thoroughly proved, and the atmospheric conditions when submerged are infinitely safer and more comfortable than those of the ordinary torpedo boat.

From four to six men are required for her operation.

The boats can be readily fitted with Whitehead or Howell torpedoes, employing powder or compressed air discharge, or with over-water projectiles fired with either powder or air or a combination of both.

If these vessels are to be supplied in large numbers; if they are to be quickly built and to become speedily available for the crises which arrive to every nation, their advantages can be the more readily understood when it is known that the elements of which they are composed and built are commercial products. Gas and steam engines can be secured from a hundred builders; electric motors have replaced and are as easily procurable as horses; electric storage batteries, though still far from being fully satisfactory, are no longer novel and difficult to obtain; compressed air cylinders are increasing every day in strength and capacity; petroleum fuel can be carried with less danger than bituminous coal; and the parts which compose the special controlling mechanisms of the system are all marketable products, easily and quickly assembled and adjusted.

In conclusion, Capt. Jaques emphasizes the fact that submarine navigation, which has so long been attempted by many nations, is at last an accomplished fact, and that we are not speaking simply from theory, but from actual practice and serious experience in a useful submarine boat.

In the design and construction and practice with the Holland submarine boats "Plunger" and "Holland," we have been going on the principle of developing not a boat simply as a toy or a working model, but one which will be especially useful for the primary purpose to which a submarine boat should be put—that is, of actually fighting vessels around the harbors and on the coast, instead of in the open sea.

The dimensions of a submarine boat proper should be governed by the necessary offensive power, and, while having in it all the destructive power desired, it should be small enough to get close up to and, practically, nibble at the bottom of the ship to be destroyed.

This object appears to have been accomplished in the "Holland," for she has all the speed necessary to control her fish-like qualities, has power to disappear, can take care of herself, and, at the same time, is able to work three very powerful guns.

While this has been accomplished, no doubt other valuable developments will be in the direction of small craft to take the place of second-class torpedo boats and battleships, and of semi-submerged boats of almost any dimensions, having armor enough above water to afford ample protection, at the same time protecting all the rest by water.

We all know how difficult it is to adequately protect a ship with armor even by a most careful distribution of weights. The semi-submerged boat presents a type in which one can armor such parts as are necessary, employing very heavy armor, having reduced to a minimum the part exposed, and possessing submarine qualities, it is the only kind of boat that will do this, as it is well known there is not a torpedo boat in existence to-day that will meet these conditions.

In such a craft one can get close up to a ship and fire the torpedo into her, while an ordinary torpedo boat will be simply riddled and sawed into pieces by rapid-fire ammunition. Further, a semi-submerged, armored torpedo boat will be able to get so near her target, that by greatly reducing the range she will eliminate many of the disadvantages of the present long ranges required for the Whitehead torpedo. Again, a well-disciplined crew is given a chance to do something, for their quarters will be infinitely more comfortable than those they at present occupy in the torpedo boat; they will have a feeling of safety which they do not now enjoy, and they will know that they will land their torpedo close enough to blow up the ship. Such a craft may be compared with a large automobile torpedo, one of sufficient size to carry a crew, and yet possessing not only similar automatic devices for controlling its position, but having them supplemented by direct mechanical contrivances under the direct control of the brain of man.

Such a boat will be practically irresistible and invulnerable; will even resist the attack of heavy ordnance, and is a type that it will be impossible for a battleship to avoid.

While giving importance to the designs that will utilize the semi-submerged principles, the great need of the hour for harbor and coast defense is a small torpedo boat that can be submerged, having within it a storage battery of sufficient power to

give it a submerged range of a few hours, with nine or ten knots surface speed and from six to eight knots submerged. Such craft can be quickly and cheaply constructed and very much more efficiently controlled and protected than the very rapid torpedo boats or torpedo-boat destroyers which represent the magnificent mechanical development of the present age.

Conditions of a Good Result from Amalgamation.

Under the above head the *Canadian Mining Review* gives a collection of practical pointers thereon, which seem in their arrangement only to be orignial with that journal. They are as follows:

1. Very fine stamping if the gold is very fine.
2. A coating of gold amalgam on the copper plates. No amalgam should be removed until a hard layer of it has been formed on the plates.
3. The use of a proper quantity of water; too much will result in a coarse crushing, a less complete mechanical exposure of the fine gold, less contact of the gold and quicksilver, and a premature sweeping off of both. The addition of too much quicksilver, though causing the formation of more amalgam, will only lead to its being swept away by the current.
4. Proper temperature of the battery water. The water ought neither to be too cold nor too hot; 90° to 100° Fahr. is the best, if by artificial means it can be raised to it.
5. The addition of quicksilver in proper quantity. This condition should be closely studied in each mill. There is always a considerable loss of quicksilver. The quicksilver when introduced in the battery is finely divided by the stamps, and thus affords an opportunity for the amalgamation of the fine particles of gold. By the violent motion of the water in the battery, produced by the fall of the stamps, particles of gold amalgam and quicksilver are carried with the pulp to the copper plates, to which they adhere.
6. Proper height of the charge in the mortar. This should not be allowed to rise higher than about 3 inches below the lower edge of the inner plates. If the quartz and pulp in the battery come nearer the plates, too much stuff, which is also too coarse, is thrown upon them, thus either preventing the accumulation of amalgam or displacing it after collection.
7. Regular feeding.
8. Care in keeping the plates clean.
9. Care in the mill against the introduction of grease or greasy substances, and against the use of exhaust steam for heating water required in any of the amalgamating processes. In lubricating the cam shaft, journals, cams, tippets, or any other portions around the batteries, care must be taken not to drop any lubricant into the mortar.
10. Rejection of hydrated oxidized iron ores, silicate of magnesia and alumina ores; they cause a frothing of the water, and coat the gold with a slime which resists amalgamation.
11. Avoidance of mineral waters for battery amalgamation, especially if they contain sulphur in the shape of sulphureted hydrogen, as a coating will be formed on the gold particles which prevents amalgamation.
12. Care that the amalgam on the copper plates is not allowed to get too hard, as it may fail to catch the gold. If, therefore, the amalgam should get too hard, it will be well to sprinkle through chamois cloth some globules of quicksilver over the amalgam. If, however, it becomes too soft again, there is danger of "flouring" and losing it, with some of the gold.
13. A dilute solution of cyanide of potassium should be always kept on hand, and when yellow spots appear on the plate some of the solution should be poured over it. If this does not remove a spot, hold a lump of the cyanide over it, or rub it, which will have the desired effect.
14. If the ores contain soluble sulphates, arising from the decomposition of iron or copper pyrites, the addition of lime will prove beneficial while passing through the battery.
15. When treating gold ores containing manganese it is necessary to clean the plates of its adhering amalgam at least once a week and give them a fresh coating of quicksilver.
16. It will be found that in many cases amalgamation can be promoted by discharging from the battery onto concentrators direct, which will collect all the heavy mineral particles which interfere in the ordinary amalgamating process, and submitting the concentrates to separate treatment. The overflow of tailings which pass the concentrators, if carried over copper plates, will give up the gold easily now, in case any fine particles have escaped the concentrating process, as the ore has undergone a cleaning process in the separation of the sulphuretted ores, which naturally interferes with copper-plate amalgamation. If the concentrations are submitted to treatment in grinding pans, the tailings from the settler ought to be run over slime tables to collect any escaping minerals of value.
17. When treating heavy pyritic ores, it will be found advantageous to have an iron pipe with little holes, discharging from the outside copper plates a fine, gentle shower of water, so as to assist the carrying off of the heavy sulphurets, which would cover the plates over and prevent the free gold coming in with them.

Discussion on "Treatment of Slimes."

Chas. Butters' recent paper on the treatment of slimes, which is the latest valuable contribution to the literature of the cyanide process, was discussed by the Chemical and Metallurgical Society of South Africa, before which it was read, and some questions asked and answered.

A. F. Crosse.—I would like to ask if you think there is a possibility of any chemical method for precipitating gold from weak cyanide solutions displacing the present electrical method.

Prest. Butters.—That is a question I have thought over a good deal. Prof. Christy of the University of California has introduced a chemical process for the precipitation of gold from cyanide liquors, and lately in my Salt Lake City laboratory, in the United States, I have had a more or less extensive set of determinations made as to the chemical methods of precipitation, but without good results. I do not think that any chemical method of precipitation will ever take the place of electrolytic precipitation for very dilute solutions. Where you have thousands of tons of solution to precipitate, chemicals must be added in such a large way that the expense is prohibitive. For instance, when we want to bring up our solution in lime, which 6s 9d or 7s per bag of 180 pounds, from 0.005% to 0.010%, it takes a lot of lime, although lime is a fairly cheap substance. You must have something in the solution of a chemical nature, and there must be an appreciable amount of that chemical present, but when you get down to 0.001% of chemical present, it seems to lose its efficiency. Very dilute solutions of cyanide seem to have more chemical power than almost the most dilute solution of any other chemical I know. With the electrolytic process all that is required is power—you burn coal, which is only another form of energy. I do not think you will see electrolytic deposition replaced by chemical methods of any kind or description, although if anyone brings a method forward I will be one of the first to study it.

J. R. Williams.—In regard to chemical precipitation, I believe that Prof. De Wilde was the first to suggest any process for the precipitation of gold from weak cyanide solutions. There have been many workers in this field since, and they all require acid solution as a starting point. I think that the total cost of precipitation would be about ¼d per ton of solution, so that until now chemical precipitation compares unfavorably with present methods.

A. McNaughtan.—I would like to ask, Mr. President, if you have ever come to any satisfactory conclusion as to whether in slimes it is really reducing agents, or sulphides, or possibly a coating of free sulphur on the gold, which prevents the solution of the gold in the cyanide solution?

The President.—I do not know what the reason is. I dissolve the gold now, whereas formerly I did not.

R. W. Schumacher.—In regard to the precipitation of slimes, is there any chance of doing without the addition of lime? I believe that lime costs 7d per ton treated, which is a considerable amount, and if the slimes could be precipitated by some cheaper reagent it would be a great gain.

The President.—I would be glad to give £10,000 to anyone who will find a reagent for precipitation that is cheaper than lime. It is a very important point and would repay any amount of study. As I have before stated, I do not know whether the coagulation of the slime in solution is a chemical action or not.

J. Loevy.—It is generally considered a physical action.

The President.—A certain amount of reagent is necessary in the water, and when you use from eight to ten tons of water per ton of ore crushed, you have to bring eight to ten tons up to a certain percentage with some chemical. If the water used in the process was kept in constant circulation, doubtless it would save a little of the lime.

A. Prister.—I quite agree with the chairman's statement that lime cannot be readily replaced by another substance for the precipitation of slimes. After some study of the literature of the subject I found that Rittinger, who has particularly investigated the velocity of falling bodies of different specific gravity in water, gives the following empirical formula in *Aufbereitungskunde* of 1867:

$$V = 2.77\,[D\,(d-1)]^{\frac{1}{2}}$$

In this case

V = velocity in meters per second.
d = specific gravity.
D = diameter in millimeters.

This formula indicates two ways for accelerating the settlement of the slimes:

(1) By increasing the diameter of the mineral particles.

(2) By increasing their specific gravity.

If the average diameter of slimes particles be increased without addition of any other substance, we obtain sands, not slimes.

Though any increase of the specific gravity of the slimes is impossible, yet we derive unexpected assistance from the discovery that the addition of lime accelerates their settlement. At first sight this appears to contradict the foregoing statements, but closer examination of the problem will, I think, confirm my explanation of it. Mr. Crosse's determination of the specific gravity of one sample of slimes was 2.62. The specific gravity of the following bodies is:

Calcite	2.5 — 2.8
Magnesite	3.0 — 3.2
Dolomite	2.8 — 2.9
Calcium oxide	2.3
Calcium hydroxide	3.2
Magnesium oxide	3.55
Magnesium hydroxide	2.37
Lime (industrial)	3.03
Clay	1.8 — 2.6
Silica	2.6

According to Mr. Bettel (Eissler's "Cyanide Process") slimes are composed of mineral particles of less diameter than 0.01mm. The settlement of slimes is very slow on account of their small diameter and low specific gravity. By adding lime their settlement is accelerated in consequence of a simple mechanical action. It will be noted that the specific gravities of dolomite, calcium hydroxide and magnesium oxide, all constituents of our local lime, are higher than that of slimes. Hence one of the conditions required by Rittinger's formula for accelerating slimes settlement is obtained, *i. e.*, increase of the specific gravity. I think that an experiment made by Mr. Bettel at his slime plant on the East Rand mines corroborates what I say. He stated, in an issue of the *S. A. Mining Journal* during January, that the settlement of the slimes was slower in consequence of the low alkalinity of the lime employed. You are aware that the lime used on the Rand contains more than 11% of silica, and as this has the same specific gravity (2.6) as the slimes themselves, it cannot accelerate their settlement on this account, but only by carrying downwards the slimes particles. The diameter of ground lime particles is undoubtedly greater than that of the slime particles, so that this fulfills the second condition necessitated by Rittinger's formula for the acceleration of the settlement. As the magnesium oxide and calcium hydroxide particles form a flocculent precipitate, they involve the slimes particles and carry them down. Lime is here the cheapest material, having higher specific gravity and greater diameter of the particles, which is available for slimes settlement. The fact that the velocity with which a body falls in a liquid depends upon the density of that liquid explains why such a large quantity of water is required.

In conclusion, Mr. Chairman, I am of your opinion that lime will not soon be replaced by another reagent for the settlement of slimes.

SOME of the more interesting additions recently received for the museum of the California State Mining Bureau are: Cinnabar and livingstonite from the Huitzuco mine, Iguala, State of Guerrero, Mexico, G. W. Moebus; plattnerite dioxide of lead: large and fine specimen of this exceedingly rare mineral from the You Like mine, Mullan, Idaho, W. J. Clark; loadstone (natural magnet) from near Coloma, El Dorado county, Cal., F. C. Leavitt; large specimen copper ore, United Verde mine, Arizona, W. A. Clark; old pick encrusted with gravel—a relic of 1848 recently uncovered by John Jacobson in cleaning out the old tail-race of Sutter's mill near Coloma, El Dorado county, Cal.—the scene of the discovery of gold by Marshall and Wimmer fifty years ago, presented by F. C. Leavitt; zeolite in basalt, Yuma county, Arizona, and very rich specimen of partzite with native silver and copper, F. C. Mathyas; a very interesting set of specimens containing fossils from the Diadem gold mine, Meadow Valley, Plumas county, and auriferous dolomite, J. A. Edman; temantite: fine crystallized specimens from the Freeland lode, Idaho Springs, Colorado, a rare mineral, W. S. Keyes; rich copper ore with native silver from the Anaconda mine, Butte, Montana, W. S. Keyes; and some others of less importance.

H. S. DURDEN, Curator.

Dredging Plant for Boise River.

D. P. Cameron, representing the Risdon Iron Company of San Francisco, has arrived to take charge of the work of erection of the dredge for the New England Dredge Company at Idaho City. He expects the machinery to begin to arrive Thursday and is advertising for teams to haul it to Idaho City. Mr. Cameron has just returned from Breckenridge, Colo., where he has put up two dredges of a capacity of 2500 yards per day each. He arrived there February 14th and had to work in deep snow. He expects to have the dredge here in operation by the 4th of June. The plant is to be erected at Warm Springs, two miles this side of Idaho City.—Boise, Idaho, Statesman.

AT a recent meeting in London of shareholders in the Golden Horseshoe Gold Mining Company, Western Australia, the chairman is reported to have made the following extraordinary assertion as to the value of the lode: "You will remember, and you must bear in mind, that every foot of the lode is estimated to be worth to us something like £20,000." What a man he would be to write letters to a daily from Dawson City!

Misrepresentations Condemned.

TO THE EDITOR:—I wish to express my views through the medium of the MINING AND SCIENTIFIC PRESS of the gross misrepresentations constantly being made by the local newspapers in the different mining districts of the Pacific coast—more especially in those districts of California lying north and south of that portion known as the Mother Lode. For instance, only last week a weekly paper published in the northern part of the State contained an account of an abandoned mine, when the ore vein was represented to be 110 feet wide and to have yielded in the past some $3,000,000 and that the ore body was still intact. Now, the true facts of the case are, to the writer's personal knowledge, that the width of this ore vein was nowhere in any stage of its development 10 feet wide, much less 110, and to be exact the vein varies from 6 inches to 3 feet in width, and is developed to a depth of about 700 feet. The actual output is not known, but is believed to be about $750,000.

In the same issue appeared a description of a mine located in the northwestern part of the State, and on which only superficial developments have been made, that was represented as being on the same vein as the famous Kennedy mine in Amador county, and of equal value also; that the richest portion of the Mother Lode was that part lying in Siskiyou and Del Norte counties; that all the mines are in the same formation that characterize the Mother Lode; and that the dike system was identical with that found in Amador and Calaveras counties. This is untrue in every detail, and such misrepresentations have a tendency to greatly injure a mining section and retard its development. It is a well-known and established fact among mining engineers and scientific men generally who are familiar with such matters that what is known as the great Mother Lode of California does not extend into Siskiyou and Del Norte counties, and the mineral zone of northwestern California and southwestern Oregon have not the same characteristics and bear no relation whatever to the great normal fissures known as the Mother Lode, which is unquestionably the greatest system of auriferous quartz veins that has thus far been discovered. There is, nevertheless, a vast field for investment in the mineral zones lying off the Mother Lode, but this should be done on legitimate lines; and I believe it to be the duty of such publications as the MINING AND SCIENTIFIC PRESS to correct the erroneous impressions made by some of our local newspapers on our unsophisticated neighbors in the East and elsewhere.

E. S. ADAMS, M. E.

Yreka, Cal., April 23rd, '98.

Recent California Mining Incorporations.

Gold Slide Placer M. Co., Auburn; capital stock $6000, subscribed $25; G. F. Huber, L. L. Chamberlain, M. Hohman, B. B. Deming.

Kotzebue Sound T., M. & T. Co., San Francisco; capital stock $100,000, all subscribed; P. H. Cook, H. M. Hough, A. H. Herriman, J. A. Ralston, C. W. Tozer, F. L. Noonan, L. E. Noonan.

Agnes G. M. Co., San Francisco; capital stock $150,000, subscribed $100,000; W. H. Storms, A. P. Johnson, H. Braunton, C. Cleve, G. Lezinsky.

Omo M. Co., Sacramento; capital stock $100,000, subscribed $41,000; W. D. Lawton, J. H. Wright, W. T. Mendenhall, H. W. Lawton, G. G. Armstrong.

North Star Con. G. Mines, San Francisco; capital stock $250,000, subscribed $200,020; P. L. Shuman, S. J. Hendy, T. B. O'Brien, E. B. Rogers, T. L. Ford.

Reed D. and M. Co., San Francisco; capital stock, $750,000; subscribed, $375,000; W. H. Martin, J. M. Bigger, J. W. Hamilton, R. R. Smith, F. H. Gould.

Balboa G. M. Co., San Francisco; capital stock, $500,000; subscribed, $50; R. E. Williams, D. McMillan, T. A. Vest, J. H. Houston, A. Phelps.

Recently Declared Mining Dividends.

Argonaut, California, 10 cents per share, $20,000; payable immediately.

Big Seven, Montana, $36,000; April 30.

Swansea, Utah, 5 cents per share, $5000; payable May 10.

Silver King, Utah, $37,500; payable May 10.

Coast Industrial Notes.

—The price of Oregon saw logs is $5 per M.; $3.50 a year ago.

—Southern California's citrus fruit crop for '98 is estimated at 4,436,000 boxes, which will net the growers nearly $4,000,000.

—A letter from Geronimo, Arizona, states that the railroad to Globe has been graded fourteen miles and the track has been laid eight miles. The work is progressing.

—The Mare Island, Cal., government construction and repair departments paid for labor during the first half of April $63,000, and during the three months ending March 31st $332,000.

—Last year the Puget sound salmon pack amounted to 434,000 cases, valued at $1,850,000. If the run of fish is as large this year as expected, it is intended to double last season's pack.

—Russian journals state that the coal discovered last autumn by a Russian expedition on the shore of Ochotsk sea is, as regards quality, better than any other coal known in Russian territory.

—The Los Angeles, Cal., *Express* says the drouth is so intense on the desert that hundreds of thousands of acres of grease wood is dying. Almost all vegetation between Mohave and Death Valley will be swept away.

—The Santa Fe Railroad Co. is contemplating closing the gap between Mohave and Bakersfield, Cal., and forming a connection with the San Joaquin Valley road. The route of the extension would probably be from Johannesburg through Walker pass and down the canyon of Kern river to Bakersfield.

—Water is being pumped from the Sacramento river and used to irrigate the farms along its banks. The barge Merritt has been fitted out with pumps and engines. At Sacramento a river boat will take hold of the barge and tow her to the neighboring ranches. The pumps on the Merritt can raise 20,000 gallons a minute.

—The daily output of the Santa Cruz, Cal., powder mill is now 5000 pounds of smokeless and 12,000 pounds of brown powder daily. The only delay caused by the recent explosion will be in the manufacture of infantry smokeless; but there is enough of this now on hand to supply 60,000 men for three months. The powder used by the American ships at Manila was made there.

—A circular has been sent out advising the owners of over 200 shingle mills in western Washington to shut them down at once, arguing that war is seriously affecting the business; that shingles have weakened and buyers stopped until they can see how they are affected. Shingle prices have declined somewhat and Eastern orders are decreasing, though this should be the busiest season of the year.

—Consul Smith writes from Moscow: "It is decided by the authorities to have an express service between St. Petersburg and the farthest extremity of the Siberian Railway which is finished. A train will be dispatched twice a month and will make the entire run in six days. The train will consist of one dining car, with library, passenger and sleeping coaches, and will have all modern conveniences. The service will commence in the month of May."

—The sealing season on the coast closed last Saturday, and the schooners, thirty-four in number, are returning home to outfit for the Behring sea season, which opens on Aug. 1st. The coast catch has been good, the estimate from reports received from the points on the coast which the schooners have touched being 7000 skins—2000 in excess of the coast catch last year. The best catches were made off the coast of California, where the schooners had fine weather and found an abundance of seals.

—Raisins, oranges and lemons are the principal fruits the United States imports from Spain, figs and currants to a smaller extent. A lessening of purchases of these fruit products should be of material benefit to California. Raisins grown in California have already checked the imports of Spanish raisins. The exclusion of these Spanish products for six or twelve months would secure a stronger foothold all over the nation for California fruits, extending their consumption and rendering it still more difficult for the foreign fruits to regain their former position.

—Northwestern papers think the Spanish war may be the means of developing the coal industry of western Washington to a most unexpected degree, because of England making coal a contraband of war. Heretofore the coal dealers who supply merchant vessels with fuel have been obtaining their coal from British Columbia mines. But during the existence of hostilities not a citizen either of the United States or Spain can buy a bushel of coal of an English subject. A big fleet of coal vessels is on the way to San Francisco from Australia and English ports. Coal is a contraband of war and merchants have been preparing for the coming struggle between this country and Spain. No more coal can come from British Columbia, the principal source of San Francisco's supply, and to guard against a shortage the Government has made arrangements for the transportation of 80,000 tons by rail from Pennsylvania.

—"It is a great country, but you cannot do business rapidly there," says J. A. Fairchild, speaking about a recent trip to Mexico. "My journey was made at the solicitation of Mr. Robinson of the Mexican Central Railway. One of my purposes was to look at the large deposits of asphalt found near Tampico. I found them very large, but the quality is somewhat doubtful. We are having tests made which will determine this point. I also went to consider some contracting plans. But you cannot do anything in a hurry there. My visit was preliminary and will be followed by others. The methods in use in letting contracts is in sharp distinction as compared with ours. The Board will meet and look all over all bids and then gradually sift the bids down till they get the one that the entire Board thinks is the best one—that is, the one from which the best work can be expected. The prices have only a secondary consideration. For example, there is now being built in the City of Mexico the finest sewer system on the continent. A French company is doing the work, superintended by Mr. Guyot, the noted engineer. The bid of this company was $2,000,000 more than the next lowest one, yet it was awarded the contract because it showed conclusively that it could do better and more perfect work in all details than any of the competitors."

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING APRIL 26, 1898.

603,003.—DUST PAN—Laura M. Black, San Antonio, Cal.

603,101.—ROCK DRILL CHUCK—E. H. Bourne, Downieville, Cal.

603,175.—SPRING-FORMING MACHINE—C. Collins, Los Angeles, Cal.

603,176.—CAR COUPLING—H. M. Cox, Linden, Cal.

603,178.—WRENCH—M. H. Curry, North Pomona, Cal.

603,133.—SEPARATOR—W. J. Dwyer, Hillyard, Wash.

603,181.—FURNACE—Farrell & Douglas, Morenci, A. T.

603,184.—PIANO PLAYER—F. H. Goolman, Los Angeles, Cal.

603,104.—GAS METER—J. Herbert, Oakland, Cal.

603,084.—TONGS—V. G. Higgins, Waddington, Cal.

603,144.—HOSE NOZZLE—Kellerman & Crane, Montesano, Wash.

603,110.—BOTTLE—J. B. Marshall, Fresno, Cal.

603,020.—FRUIT STEMMER—G. Pettit, Fresno, Cal.

603,211.—SURFBOAT—L. W. Stevens, Los Angeles, Cal.

603,119.—WINDWHEEL—E. H. Thompson, Newark, Cal.

603,159.—WRENCH—E. M. Tyler, Auburn, Cal.

603,215.—ROPE RAILWAY—C. L. Van Buskirk, Lodi, Cal.

602,988.—LAND ROLLER—W. Wildman, Spadra, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ROCK DRILL CHUCK.—Edwin H. Bourne, Downieville, Cal. No. 603,101. Dated April 26, 1898. This invention relates to a chuck or holder for rock drills and is especially designed to automatically lock the drill in place by the simple act of introducing it into the chuck and starting it to work, and it also provides an easy means for releasing it when it is to be removed. It is difficult to fix the shanks to rock drills in the end of the movable driving head or piston so that they will remain tight, and it is still more difficult to remove them when it is necessary. This invention consists of a segment in one side of the socket having an inclined or tapered inner wall and a straight outer wall to fit closely for its entire length in the corresponding wall of the socket. A second segment in the opposite side of the socket has an inclined or tapered inner wall and a straight outer wall, the inner ends of both segments abutting against an internal shoulder in the drill socket. A pin is driven transversely through the upper end of the first-named segment and permanently secures it in place, and a single wedge-shaped key is placed centrally behind the other segment so as to be moved to a point where the segments will stand with such relation to each other that the head of the drill shank, being tapered to correspond with the interior bore of the segments, will lock itself by the impact of the blow when it commences to work. The wedge-shaped key is so constructed that by driving it back or loosening it slightly the segments will be separated and the drill will fall out without difficulty.

COIN-CONTROLLED METER.—J. Herbert, Oakland, Cal. No. 603,104. Dated April 26, 1898. This invention relates to a coin-controlled apparatus which is especially designed for the measurement of gas, water, or other substances which can be so measured, and may also be applied to the measurement of electrical currents by the same mechanical operations. It comprises a coin chute, an adjustable stop in the line of the chute by which the coin is arrested, a gate movable transversely with relation to the coin chute and having a hole made through it, a rod or stem standing in line with the hole so that it operates upon the gate only when the coin is in position between the rod and the gate. An arm is connected and movable with the gate and a vertical screw-threaded shaft is provided with a loosely slidable weight movable upon it, a lever arm carrying a screw-threaded segmental nut is adapted to engage the screw-threaded shaft and retain the weight in position, and as the screw turns the nut will be moved and caused to travel from one end to the other. This is effected by a contact portion of the lever against which the gate-actuated arm presses when the gate is moved so that the segmental nut is disengaged from the screw and the weight allowed to drop. As soon as the gas commences to flow it acts through the usual meter mechanism to turn the screw, and this moves the nut with which the weight is connected until it arrives at the point where it shuts off the supply of gas or other medium until another coin has been introduced, when the operation may be repeated.

Personal.

J. E. SUMMERS is appointed Supt. Scanivino mine, Sonora, Cal.

M. EDIAMS becomes Supt. Bryan & Sewall mine, Republic, Wash.

R. WALKER, a mine owner of Grass Valley, Cal., is in San Francisco.

N. CARMICHAEL becomes Supt. Keystone mine, Amador City, Cal.

LEO VON ROSENBERG, a New York mining engineer, is in San Francisco.

W. H. MCCLINTOCK, Supt. Goodwin mine, Sonora, Cal., is in San Francisco.

PROF. N. S. KEITH has made headquarters at 62 Nevada Block, San Francisco.

S. W. CHENEY, Supt. Jamieson mine, Johnsville, Cal., has returned to San Francisco.

T. CLARK, owner Franklin mine, Placerville, Cal., has returned home from San Francisco.

HON. CURTIS H. LINDLEY has returned to San Francisco from a professional visit to Washington, D. C.

H. W. FAIRBANKS has returned to Berkeley from a reconnoissance of the southern California oil fields.

CHARLES BUTTERS is daily expected in Salt Lake City, Utah, en route to San Francisco from South Africa.

W. J. SHARWOOD of the University of Cal. has taken a position as chemist to the Montana M. Co.'s cyanide plant, Marysville, Montana.

GARDNER WILLIAMS, one of California's eminent mining engineers, for some time in charge of South African properties, is expected in San Francisco next week.

THOS. KEARNS, Mgr. Silver King mine, Utah, is in San Francisco. He, with Messrs. Keith and Newell, have been negotiating for the purchase of the Isabella mine, Tuolumne Co., Cal.

WILLARD L. MORSE, for the past two years general manager of the Huantla Santa Ana Mining Co., Huantla Morelos, Mexico, has been appointed assistant general manager of the various smelting and mining companies owned by Messrs. M. Guggenheim's Sons in Mexico.

Commercial Paragraphs.

DEARBORN DRUG & CHEMICAL WORKS, 2327 La Salle St., Chicago, Ill., will send to any address their two recent booklets, of value to all steam users and consumers.

IT is again asserted in New York City that a consolidation of the diversified interests in the electrical field is under contemplation and that the combination would take in the General Electric, Westinghouse and Walker Companies with a combined capital of $100,000,000.

THE E. P. Allis Company, of Milwaukee, has a contract for the engines and boilers for the Deadwood and Delaware Smelting Company, of Deadwood, S. D., to be placed in a new smelting establishment. They have this week placed a new furnace at Daggett, Cal., for the Pacific Coast Borax Company.

TWO MINING EXPERTS from Japan, after examining the large compound condensing pumps in the Free Silver mine at Aspen, Colo., built by the Jeanesville Iron Works Co., Jeanesville, Pa., and bought by D. W. Brunton, placed an order with the Jeanesville Co. for two compound condensing mine pumps, 1000 gallons per minute capacity, for Japan.

THE San Juan Gold Mining Co. of Telluride, Colorado, has placed an order with the Colorado Iron Works Co. for a 100-ton dry crushing plant. Their patent high-speed, narrow-face rolls will be used to do the fine crushing. The sizes of these rolls are 54x8 inches, 42x6 inches and 30x6 inches. Bruckner cylinders, roasters, screens, ore breakers, elevators, etc., constitute the balance of the machinery for this plant.

THE Grace Dollar, a steamer built by the Fulton Engineering and Shipbuilding Works, will be launched within a few days at Harbor View. The boat is 175 feet long and was built for Robert Dollar, who has chartered it for one year to the Johnson-Locke Co. to ply between San Francisco and Kotzebue Sound. The Fulton Works are also constructing two freight steamers, each 160 feet long, which will be launched next week.

THE Pelton Water Wheel Co. have under construction a power plant for the British Columbia Railway Co.—the most notable installation of the kind in the Northwest. The power station is located at Gold Stream, some twelve miles from Victoria, and the water supply is furnished from the Esquimalt water works system. The plant consists of two 38-inch D. N. Pelton wheels, 600 H. P. each, running at 600 revs. under 590 feet head. The wheels are direct-connected to Canadian General Electric generators by insulated couplings. The power thus generated is to be transmitted to Victoria at a pressure of 10,000 volts and then used for running the railway system of that city, lighting and general power purposes.

THE Weber Gas & Gasoline Engine Co. of Kansas City, Missouri, report the following sales of gasoline hoisting engines last week: One 10 H. P. single-drum, geared Weber gasoline hoisting engine to the Cornucopia mines of Oregon; one 25 H. P. double-drum, geared Weber gasoline hoisting engine, to be used underground, hoisting from slope, to the La Aurifera mine, Monterey, Mexico; one 10 H. P. single-drum, geared Weber gasoline hoisting engine, to the Copper Queen Mining Co., Globe, Ariz.; one 10 H. P. single-drum, geared Weber gasoline hoisting engine, to Boise City, Idaho; one 10 H. P. single-drum, geared Weber gasoline hoisting engine, to Denver, Colo.; making five shipments of Weber hoisters to mining concerns in one week.

American Goods in Europe.

Archer Brown, a wide-awake American manufacturer, who has been studying the European industrial situation at short range, writes:

It is in finished forms that the business looks most encouraging. An American machine has come to be regarded in foreign countries something as an American dentist. It is known to be superior to the home make. The Germans especially have been quick to appreciate this fact, and in the past few years have taken enormous quantities of our iron and wood-working machinery, agricultural implements, bicycles, sewing machines, pianos, organs, etc. Last year one firm in Berlin imported $2,000,000 worth of American machinery, and right here may be an element of danger to American industries. The Germans are very progressive, and are quick to see the advantage of the newest and best methods of manufacturing, and have a far-sighted industrial policy. They propose not only to take care of all their own markets, but to take the lead in the world's commerce. The American machinery that is now going there is helping to equip their factories for a struggle with Great Britain; but when they are once equipped and the present activity in their own iron works has lessened somewhat, they will equip the machinery and no longer have use for the American article. This is already being done to a large extent. An intelligent manufacturer in Freiberg, South Germany, told me they were making American machines all over Germany, and very soon would have no more need of us. They copy our agricultural implements, machine tools, stoves, etc., exactly and produce a superior article. They do not go quite as far as the Japanese, who even copy the name plates and other accidental marks, but they stick close to the American patterns.

It must be said, however, that the English and Germans manage some things better than we do. When a good business is current, they manage to protect the shareholders in their enterprises and secure some profit on it. In fact, the first thought in each enterprise is the dividends. An illustration of this occurred in London the day I left. The Metropolitan Gas Company at its annual meeting the day previous announced that its earnings were insured to maintain the usual dividends to the shareholders, and therefore the price of gas would be raised. There was naturally a howl from the consumers, but the shareholders had to be protected, even though it was claimed that poor management was the cause of the decreased earnings. Railway rates are maintained rigidly three or four times above those we are accustomed to in our country; but, as the directors of the railways point out, they kept their roads out of the hands of receivers. Manufacturers may complain that they are prevented from competing with other nations, but the railway shareholders get their dividends.

The Germans accomplish the result at least in the iron and steel trades, by a wonderful system of syndicating. Their furnaces, steel works, rolling mills and coal mines in Germany are syndicated and the prices maintained at a level high enough above cost to insure good profits. If it is necessary to meet foreign competition in any line the works which happen to be situated on the frontier are instructed to drop prices at whatever point necessary to drive off the intruder.

There seems to be no abatement in London of the fashion of recognizing or "bringing out," as they call it, industrial enterprises. Every London paper prints daily from one to half a dozen prospectuses. The companies that are exploited are located in every part of the world, but the United States cuts a much smaller figure than formerly. We have unloaded onto the British so much industrial rubbish with disastrous results to the investors that there is very naturally a deep-seated prejudice against anything from this side. Their experience with our railroads has been equally unfortunate. The English seem to have had a wonderful faculty in the past of getting into whatever there was on this side of the water that was peculiarly hazardous. They have been caught by prospectuses, promising enormous profits, and the reaction which followed has even injured legitimate American investment. It is astonishing how many careful London investors hastened to put money in the Middlesbrough, Ky., speculation of five years ago. It is said that something like $15,000,000 of good English money was sunk there.

The temper of the investor to-day is such that anything with an American label must have a good record of earnings behind it to command any attention. Our gilt-edged and low-priced securities are taken even in huge blocks. But the average promoter has but little chance there unless his venture happens to be in British Columbia, South Africa, Australia, or some other part of the world not tainted with the name of American. I am not sure but that this change will prove a wholesome thing for this country, for we are now passed the period when foreign capital is needed to promote our legitimate undertakings. Too easy access to foreign capital has, in many instances, stimulated ventures in railways, manufacturing, town buildings, etc., that ought never to have been gone into.

The English are a decade behind us in the ordinary comforts and improvements of modern life, but you had better not say that over there. There is not a modern steel office building or business structure, such as we are familiar with in Chicago, New York and many other American cities, in all Great Britain. They still build in massive stone or brick from three to six stories high, having a few steel beams for strengthening the interior of the structure. Occasionally an office building is supplied with an elevator or lift, but these are rare. An Englishman who had seen our superb modern structures in America, told me there were two reasons why they were not adopted in London and other large cities. The first was that the cities would not allow them to be built, and the second was no one would rent their offices if they were built. Their railway tracks are perhaps the finest in the world, but their railway equipment is antiquated to a great degree. The freight cars, "good vans," as they call them, have an average capacity of about seven tons; but the very largest on some lines only carry about five tons. In this country, you are aware, the average freight car now carries thirty tons.

Cast iron pipe is made in 9 foot lengths for the reason that English iron is not clear enough to run into 12-foot lengths, as is customary on this side. English engineers, therefore, whether in England or in the colonies, always specify 9-foot lengths. Our manufacturers underbid them, but bids are usually thrown out because they cannot conform to the 9-foot standard. It is not claimed that the latter has any advantage over the former, but precedent governs. A pipe maker told me that Yokohama, Japan, turned down an American bid for 6000 tons of pipe and gave it to an English manufacturer at $6 per ton higher price because they were advised by the English engineer that it would be dangerous to put in 12-foot lengths on account of earthquakes in Japan. The Japanese paid $36,000 as a tribute to a false conservatism.

Our outputs of iron and steel are so large, and our cost of manufacturing has been so greatly reduced by the compulsory education of the panic, that we are selling in nearly all lines at the lowest prices in our history. In a sense this is hard on our makers, but, perhaps, in the long pull, it is the industrial conquest of the world. The prospect for the year is for a very large business, with but little improvement in prices.

THE United States Atlantic coast line is 2349 miles long, the Gulf coast line 1556 miles and the Pacific coast line 1810 miles—a total of 5715 miles.

Sampling Ores for Assay.

F. D. SMITH.

It may seem strange to some that we should assume the position of a teacher when we tell men engaged in mining how they should and should not select samples of ore for assaying, but if the best informed and most honest assayers are to be credited, miners and prospectors must admit that they make serious and grave mistakes in selecting their samples to be sent to the assayer. Leaving out of the question the problem of taking samples for other parties, or samples which are purported to represent the mine or prospect to other parties, and considering the proper method of taking a sample for an assay which shall be of use to the miner or prospector alone, we find in these cases alone grave and serious mistakes.

Of course, if one finds a new lead or a bit of float rock, the assay here is intended to show only whether the metals sought are present or not, and but little attention will be paid to the question of "how much." But when one wants an assay to give an idea of the quantity or value of the mine or any portion of it, it certainly will not suffice for the prospector to use the usual lax methods in sampling. It costs no more to obtain an assay that tells you something definite about your prospect or mine than it does to have an assay made which tells you that the particular small chunk, weighing sometimes but an ounce or two, that you bring to the assayer has such and such values, but another piece of the same size taken near it would vary a hundred fold.

It is true that if one knows nearly the value of certain appearing rock, and should strike a new and different kind coming in, a small piece of this new mineral assayed would give the miner an idea whether he could expect that as it increased or decreased he would be richer or otherwise. But it is a very common occurrence to an assayer to hear his customer say, as he reads his report of an assay on a piece of ore the size of an egg, "that ore, then, will not pay to ship," or "that ore will pay me to mine." As if the miner could be so foolish as to think that it would do to base any extended operations involving hundreds of tons of ore upon the value of a single piece weighing an ounce. Yet the above is an actual case which happens every day.

Did you ever stop to think or do you already know why your ore varies so much in different parts of the shaft or tunnel according to the results of apparently reliable assayers, or why your returns from the sampling works are so different, and generally lower, than the results that you have received from your own assayer when you have carried to him your own selected samples?

Did you never think that perhaps you might be a little more charitable to some of the assayers that you brand as unreliable and whose results never agree with some other man's, and that you might lay a great deal of that blame upon yourself for carelessness in taking samples.

The truth of the matter is the average prospector and miner cheats himself every time he attempts to take a sample for his own individual use. He will invariably take only those parts which have considerable mineral, be it pyrite, galena or any other sulphide, or whether it carries the oxides or carbonates. He thinks why should he carry down a lot, or even any barren quartz with the mineral. What he wants is gold, silver or lead, and he knows that he cannot find it in pure quartz portions, and so he takes only the mineral portion, gets his assay returns and cheats himself out of his work and the price of an assay, but will subject himself to the disappointment of finding his smelter returns much lower than he expected.

The lesson is, take larger samples, take pieces from every part of the face of the drift, or from the whole pile that came out from a certain number of feet in sinking, and if not convenient to send so large samples, break all pieces up and mix thoroughly, and the sample out by taking out every other shovelful until the size is reduced to the required amount. Above all, in getting this large sample, do not be afraid of taking a fair proportion of the rock which does not show any mineral, for that all must be mined and shipped with the good, the tares with the wheat. Then your assay will tell you something about your mine that will be worthy of serious study; and your assayer (if he is honest) will not silently pity you for throwing your money away.

Submerged Valleys on the California Coast.

A preliminary paper of 1886 is now followed by a more detailed account of the "Submerged Valleys of the Coast of California, U. S. A., and of Lower California, Mexico," by George Davidson (Proc. Cal. Acad. Sci., 3 Ser., Geol., I., 1897, 73–103). Along our Pacific coast the continent descends to depths of 2000 to 2700 fathoms within fifty miles from the shore line. There is generally a ten-mile platform sloping out to the 100-fathom contour, after which the descent is relatively sharp. The edge of this platform is broken by twenty-seven "submerged valleys," finely illustrated in nine plates where all soundings are shown, so that one may measure the accuracy of the interpolated contours and be convinced not only that the platform is sharply notched where the submerged valleys are drawn, but also that it is essentially continuous elsewhere. The notches are sometimes in line with rivers on the land, as at Monterey and Carmel, but others appear to be entirely independent of existing drainage, as King peak and San Pablo valleys, both of which have to be named after mountains opposite their heads. The curious story is told of a vessel that was lost on the rocky coast fronting King peak. She probably had run in along the axis of the submerged valley and, finding no bottom with the ordinary line, thought she was at a safe distance off shore. The possibility that certain chasm-like valleys, such as that at Vincente, result from dislocations appears to be excluded by the evenness of the littoral platform on either side of the chasm, but the actual origin of the valleys can hardly be found until they are studied in connection with the structure, form and drainage of the neighboring and still visible land. In noticing, *Science* thinks it well to guard against the implication that submerged valleys result from "continental" movements by remembering that the earth's crust may bend beneath the sea as well as upon the land, and that the down-bending and consequent submergence of a coastal belt give no more warrant of a truly "continental" movement than does the occurrence of a local inland anticline.

"WHAT possible plan can be devised to stand off the mosquitoes?" is the practical question asked by a miner preparing for departure to Alaska. It is worth serious answer. The mosquito is an additional menace to Alaskan residence. Petroleum finely sprayed over the hatching ground is fatal. Permanganate of potash is also a destructive agent. Two and one-half hours are required for a mosquito to develop from its first stage, a speck resembling cholera bacteria, to its active and venomous maturity. The insect in all its phases may be instantly killed by contact with minute quantities of permanganate of potassium. It is claimed that one part of this substance in fifteen hundred of solution distributed in mosquito marshes will render the development of larvæ impossible; that a handful of permanganate will oxidize a ten-acre swamp, kill its embryo insects, and keep it free from organic matter for thirty days at a cost of 25 cents; that with care a whole region may be kept free of this pest at a small cost. An efficacious method is to scatter a few crystals widely apart. A single pinch of permanganate has killed all the germs in a 1000-gallon tank.

Mining Summary.

CALIFORNIA.

Amador.

W. S. Weymouth is operating the Webster mine at Quartz Mountain and is building a 5-stamp mill.——At the Baliol mine the new shaft is down 50 feet. The new hoist will be run by steam.——J. A. McIntire started the pump at his mine near Amador City, preparatory to doing further development work. Mr. McIntire has secured bonds on several adjoining claims.——At the Pocahontas, near Drytown, Supt. McWayne is driving the crosscut on the 600 level, and on the 400 level the drift is in 400 feet. Quartz showing free gold and sulphurets has been found, and from present indications the condition of the mine will soon warrant the erection of a mill. Three thousand feet of underground work has been done at a net cost of $35,000.——The Pocahontas mine, near Plymouth, is still exposing good ore in the upper drifts.——The shaft of the Zella will be sunk 200 feet deeper and work will begin soon.——The shaft of the Amador Queen No. 1 has reached nearly 1000 feet.——In the Kennedy mine, at the 2400 level, in the north shaft, a large body of ore has been found that will pay to mine and mill. The Kennedy has yielded nearly $8,000,000 since its location in 1860, and has paid nearly $3,000,000 in dividends. The north shaft is down 2400 feet on the incline, but vertical it would be 2150 feet. There is a second shaft down 600 feet south of the north shaft, which is being sunk to the level of the other, to intersect the drift now being driven southward from the north shaft. There are levels every 100 or 200 feet, and work is being prosecuted in all of them.——At Amador City a new ore body has been discovered in the Keystone mine. The ledge is 40 feet wide and extends from the 500 to the 800 level. The main shaft in the mine is 1400 feet deep, but the principal work of recent years has been on the 600 level. The ore will average $10 a ton.

Butte.

At Nimshew the Matheson mine has resumed operations.——The Boulder placer mine is working day and night.——Owing to the low water this spring in the middle fork of Feather river, men are locating claims in places where they were never able to mine before.——At Cherokee, Portuguese have obtained the right to work the tailings from the Spring Valley hydraulic mine. Those tailings fill Saw Mill Ravine 50 feet deep and 100 feet in width and are believed to pay well. There were large lumps of clay that came down from the banks which were never dissolved and these are known to contain gold. These clay lumps have been slaked and can now be worked. A line of sluices and water power derricks will be used.

Calaveras.

Dispatch: At the Gwin mine they have an 8-foot ledge in the face of the south drift on the 1400 level. At the south or old Gwin shaft, they have the water down to the 1200 level. The pumps are run by compressed air. Free coarse gold has been drawn up by the pumps and the water is full of sulphurets.——The Machu mine has been cleared of water and the work of taking out ore has commenced.——At the Empire and Billy Williams work is pushed steadily under the management of F. Rainville; each place is working ten men.——The Champion, under the management of W. B. Everett, is putting in machinery and in a few days the pumps will be started. This mine is 950 feet in depth; the water comes within 50 feet of the surface.——The Keltz is taking out ore for shipment.——Griswold & Jewell of Sandy gulch are working two shifts at the Hubert mine on good ore.——The Holliday M. Co. at Douglass Flat have their shaft down 65 feet in good gravel.——The Ohio M. Co. are working two shifts on development work.

El Dorado.

At the Union mine, near El Dorado, a gasoline hoist will be placed in the tunnel, to sink 500 feet on the ledge.——T. S. Houser has discovered some good ore in the Honolulu mine, near Georgetown.

Inyo.

At Mono lake two cyanide plants, one at Lundy and the other at Copper Mountain, are to be put up this spring, and a hydraulic outfit will be placed between the lake and Lundy.

Kern.

Miner: G. M. Rose had ten tons of ore from the May Queen run, which turned out $90 per ton.——A force is working on the Blackhawk taking out good ore.——C. A. Burcham is working the O. K. mine with ten men and has a ledge about 3½ feet thick; the ore is estimated from $40 to $100 per ton.——The leasers made a shipment of thirty tons of ore from the Sister mine. They are sinking a 200-foot shaft. The ore runs from $15 to $18 per ton at present depth.

The King Solomon mine at Garlock has been improved by an air shaft from the 315-foot level.——Miles & Buckley are taking out some low-grade ore from the Sunrise mine.——Rich ore was milled at the Red Dog mill from the Butte mine.——The Red Dog mill is running regularly; several ore teams are bringing ore all the time.——The Mineral Hill group in Panamint has been sold to M. Day of Los Angeles for $8000.——Twenty men are employed at the St. Elmo mine and ore is being shipped to the Victor mill daily.

Mariposa.

(Special Correspondence).—Only development work is in progress at the Merced properties. Sinking continues in the main shaft of the Mary Harrison, which has reached the 700 level, and is being enlarged at the top to three compartments. Drifting from the old workings toward the shaft is in progress on the 500 and 600, and connections will be made within a month. A winze is being sunk from the 600. All developments show good ore. Considerable work has been done in the way of filling stopes which were but slightly timbered last year, and have caused much trouble by caving. New hoisting works are to be built at the main shaft, and the large engine now lying idle at the Louisa shaft will be moved there. Officials of the company in the East still announce that large additions are to be made to the present milling capacity of forty stamps.

F. A. Farnum has succeeded E. J. Gilbert as Supt. for the California Exp. Co. at the Virginia. Owing to frequent changes and adjustments of machinery, the new mill has been unable as yet to make a continuous run. The cleanups from the two short runs have been very satisfactory. The company has been making extensive surveys with a view to either bringing water to the present mill or transporting the ore to a new mill site, three miles away, on the Merced river.

The Montana M. Co., lessee of the Louisiana, is keeping the mill running steadily at its full capacity with good returns.

The Compromise mill made a two weeks' run on ore from the new chute. The result was a profit over all expenses from the free gold, without taking account of the sulphurets, which carry about one-half the values of the ore. The old shaft, 400 feet deep, is being reopened, and will be pumped out.

The Bondurant tunnel is now in 900 feet, without cutting the vein, which it was expected to tap in about 500 feet. As the tunnel has drained the old workings, it is thought the vein is not far away now.

A small force is working at the Red Banks. The large body of ore cut about the first of the year in the Crown Lead proved to be only a bunch, and further work is under way to reach the main ore body.

Seven or eight quartz pockets have been taken out within the past thirty days, ranging from $500 to $4000.

Mariposans are well satisfied with the showing of the county for 1897, having moved from sixteenth place up to fourteenth, and showing the largest increase, except Tuolumne and Kern, of any in the State. Notwithstanding the threatened water famine, a slight increase over the figures for 1897 is looked for during 1898.

Mariposa, Cal., May 2nd, '98.

Placer.

Sentinel: The Hidden Treasure Drift Gravel M. Co. at Sunny South has 269 men on the pay roll. Four hundred tons of gravel are daily taken from the mine. A storage reservoir is being constructed.——The new tunnel at the Herman quartz mine near Westville is in over 800 feet. It is 5x6 feet in size and two shifts of men are making about 36 feet per week.——The J. G. Peters M. Co., organized last week, commenced operating near Dutch Flat. They have purchased the Opel & Williams claim, and will run a 500-foot bedrock tunnel to open it.——Good quartz has been struck in the Azalea mine at Blue Canyon. The tunnel has reached 800 feet, the whole face showing quartz. Several small stringers have assayed from $2 to $7 a ton. The company is running the tunnel for a gravel channel.

Plumas.

Work has resumed at the Four Hills mine, near Johnsville.——The Plumas-Eureka, it is stated, will keep a small force at work during the summer.——P. Laurenzi has begun work on his Gold Lake property.——The Golden Ancient M. Co. of San Jose will sink a shaft on Bear creek.——Work continues in the Slate Creek tailing claims.

The *Bulletin* says that, notwithstanding the dryness of the season, the outlook for mining on the North Fork this year is reasonably good.——The Pliocene drift mine is being worked by Austin & Cadle, who are getting good pay.——A. Cameron is working his drift mine with reasonable success.——The Dunn Bros. are running their mill on ore from a 3-foot ledge.——Bennett & White are putting in a wing-dam and preparing to work the White River Bar property during the coming season.——Hickerson & Davis are working a drift claim near Independence Bar. In their development work they have made more than expenses.

San Diego.

The ledge on the Stratton mine, in the Mesquite district, is 3 feet wide and goes about $25 per ton.——W. D. Luce is working the old tailings of the Cargo Muchacho mine with a cyanide plant of 100 tons capacity. There are about 100,000 tons of tailings going about $2 per ton in gold.

Shasta.

Activity in mining about the old town of French Gulch continues.——The Washington M. Co. has resumed leasing ground and has a number of leasers at work.——The American mine, owned by San Francisco parties, has been bonded to Eastern people.——G. Reinhaus has a force at work on his property. He has taken out ore which he is shipping to the smelting works. It is believed the ore will yield $100 per ton in gold.——The Brunswick mine is under bond for $35,000.——F. B. Rossi is running four stamps and crushing eight tons of ore per day, expected to yield $20 per ton.——Howell & Motherwell have been operating the Three Sisters mine for several months under a bond.——H. Paige, near Shasta, is running a tunnel on the vein and has reached 250 feet.——Cook & Co. purchased four quartz claims on Mule mountain and have commenced development.——The Boswell Bros. sold a claim near Shasta to Knox & Co., who have commenced development work.——T. Price has sold his quartz claim near Middletown. The purchasers are sinking a shaft.

W. S. Boyd, near Shasta, has a tunnel 100 feet on good ore. He contemplates building a 5-stamp mill.——Diestelhorst Bros., who have been successfully operating the dredger in the Sacramento river, near Redding, are wingdamming the stream near the same place.

Siskiyou.

The ore being taken from the Little Queen mine near Fort Jones is said to yield $50 per ton.——Sargent & Dayton are driving a tunnel on a ledge that varies from 6 to 24 inches. They have fifteen tons of ore on the dump.——D. Jones will shortly start his mill on the Gray Eagle mine.

Journal: The LaFlesh & Co. quartz mine, near Henley, is worked constantly with good success.——The Jilison & McIntosh quartz mine continues to pay. The ledge is about 2 feet. Thirty men are employed.——The river miners in the Honolulu district are hurrying work day and night, on account of the river being lower than general. The McConnell & Quinne claim, Manzanita Bar claim and Vesey Creek claim are enclosed with wing and head dams and are hoisting gravel. The Pacific mine, Benz Bar mine and several others are ready for hoisting. In a few weeks more every claim on the river from Hornbrook to Hamburg will be ready for hoisting gravel.——H. H. Hunter is working in the lower tunnel of his Cherry Hill quartz mine, with the intention of putting in a quartz mill next fall, there being insufficient water at present for a mill. He has taken out about 300 tons at the upper level from a tunnel 350 feet.

News: The Minetti B. mine has resumed operations.——Two giants are at work on the Grider mine at Sciad.——Baker's quartz mill on Indian creek is running steadily.——The Bunker Hill mine, near Happy Camp, is still running.——The Gold Ball mine is running night and day on good ore.——There is a suit pending in the Superior Court which is of interest. C. J. Fry and T. Macauley entered into an agreement with J. McCaw for the sale of their mining property near Fort Jones. McCaw was to pay $2500 on or before April 22, which was to be the first payment for the full amount—$35,000—to be paid for the mine. On that day McCaw was on hand and tendered the money, which was refused, Frey and Macauley claiming that McCaw had not fulfilled his part of the agreement. McCaw has brought suit for the specific enforcement of the contract and asks for an injunction restraining Fry and Macauley from mining pending the determination of the case.——Five hundred tons of ore was crushed by the Gold Ball M. Co., on Salmon, and the cleanup amounted to $6000.——At the Shurtleff mine, on Humbug, seventeen men are employed. They have a 4-foot ledge of promising rock.——A large amount of development work has been done on the Gold Run mine on Know Nothing creek and a quantity of good ore uncovered.——The King Solomon and Queen Sheba mines on Mathews creek have been incorporated under the name of the Canyon Mountain M. Co. Upon this property there is an 8-stamp mill which crushes twenty-five tons per day. The returns show the ore to be worth $10 per ton.——The Siskiyou mine, near Happy Camp, expects to run two months longer this season.

Trinity.

Notwithstanding the light rainfall of the past winter and the present low streams in the Coffee Creek district, a great deal of prospecting is being done there.——Truax & Dillon quartz ledge made a strike on the east fork of Coffee creek.——On Morrison gulch they have a ledge which will yield $35 a ton. The ledge is 4 feet in width. The ore is estimated to yield from $400 to $600 per ton.

The Enterprise mine, near East Fork, is crushing a fair grade of ore.——At New River the Mountain Boomer mine is worked by leasers with satisfactory results.

Tulare.

At White River, Makey & Brooks struck a 15-inch ledge in the Woody mine that assays $50 a ton.——Dunlap Bros. are taking good ore from the Richelieu mine.

Tuolumne.

Thirty years ago the Agnes gold mine, then known as the Good Friday mine, was worked superficially. Ore stoped on the south vein returned in a custom mill about $20 per ton. Since re-opening the Agnes mine, the east drift from the shaft has been extended a short distance, and a drift has been run west 12 feet, all on ore. A new company recently formed is doing considerable development work under the superintendence of W. H. Storms.

Democrat: The new shaft on the Mt. Jefferson has attained a depth of 200 feet and cut a new ore chute; sinking will be continued to the 400-foot level and then suspended temporarily to drift. At the 100-foot level the vein is being drifted north and south, showing a width of 9 feet, with ore worth $20 per ton. At the 200 the vein has been crosscut, a station put in, and drifting begun. At this point the vein is 10 feet wide. A large amount of ore is ready for crushing, and when the mill is completed there will be plenty for steady running.——The Scanavino mine, near Cherokee, has started up with J. E. Summers as Supt.——The Dreisam's new mill will have its stamps dropping soon. In the mine everything is progressing.——The force under Supt. Tonkins has cut the vein of the Blue Lead after driving the crosscut tunnel several hundred feet. The ledge, though not large, is rich.——At the Kanaka mine ore is being extracted from three tunnels. The vein varies in width from 2 to 4 feet, with a rich streak of pay ore, although all the quartz mills $10 per ton.——The mine is reported clearing $6000 per month, though its output will be largely augmented by the addition of milling improvements now under way. The quartz carries sulphurets which assay high.

Independent: The No. 2 shaft of the Trio mine is down 400 feet. The No. 1 shaft has been sunk to a greater depth.——The Continental mine is being worked to a limited extent with encouraging results. An arrastra is used on high-grade rock.——At the Draper mine the company has not put up any machinery, but will do so soon.——The water is all out of the Bonanza mine this week and they are preparing to sink.——The Rawhide M. Co. will add forty stamps to their mill, increasing its capacity to eighty stamps. The company is interested in the electric plant being built at Phœnix lake. This plant will generate 2000 H. P. from 500 inches of water and a 900-foot fall. The Rawhide mine at present uses 150 H. P.——The Riverside mine, near Columbia, has been reopened and work progresses. A force is replacing timbers and clearing out the mine, getting ready to work the property in a systematic manner.——At the Black Oak mine a cement bulkhead has been put in on the eighth level to hold the large body of water which was recently encountered there. The bulkhead is 3

STEAMERS TO KOTZEBUE SOUND.—PACIFIC COAST and KOTZEBUE SOUND TRANSPORTATION & TRADING COMPANY'S (JOHNSON-LOCKE MERCANTILE COMPANY, Agents,) New Steamer, the GRACE DOLLAR, capacity 300 passengers and 800 tons of freight, will leave San Francisco June 1st for St. Michaels and Kotzebue Sound.

Passengers intending sailing for Kotzebue Sound are reminded that the GRACE DOLLAR is a newly built, triple-expansion steamer, lighted with electricity, with every modern convenience. Her bows will be sheathed to enable her to make early progress through the breaking-up ice in Kotzebue Sound, thus landing her passengers ahead of sailing vessels or other competitors.

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The KOTZEBUE SOUND TRANSPORTATION & TRADING COMPANY will erect at a convenient point on the Sound a store, trading post and warehouse, where supplies will be kept for the convenience of miners.

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Thereafter she will ply between St. Michaels and Kotzebue Sound, making three or four trips a month, and will connect with the steamer "Morgan City" for San Francisco.

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feet in thickness. An iron pipe has been placed so that the water can be pumped out as desired. The chute of ore discovered on that level almost doubles the present value of the mine.

NEVADA.

W. J. Douglass has fourteen men repairing the flume and ditch, preparatory to starting up the concentrating machine on the Douglass tailings. A test of a thirty-day run will be made.——The Boston & Nevada Co., operating a year ago on a copper property at Yerrington, have decided to resume work and prospect the vein to greater depth.

OREGON.

The first cleanup of the Oregon Gold E. Co., proprietors of the new cyanide plant in operation at Ashland, was made and information is given out that the test has been sufficient to insure the success of the process in extracting gold from the ores of southern Oregon. Several bricks of amalgam were realized at the cleanup, one of which weighs eight pounds. ——Knighten & Mayfield shipped ten tons of ore to the Huffer mill near Jacksonville.—— The Lewis M. Co. of Leland has 200 men building their ditch from Grave creek.—— Operations at the Ashland-Mattern property are progressing. A quantity of good ore is being taken out daily, and the mill is kept at work with good results.——M. Van Brunt, the New York capitalist who purchased the Steam Beer mine near Leland, is enlarging the ditch to his mine, seven miles long, and will put in a pipe line 3500 feet. He also contemplates building another ditch ten miles long for getting a greater head of water, with the end in view of working his mine all the year.——It is stated that the Golconda Co., near Baker City, has determined to adopt the chlorine-bromine process. The company owning this process has entered into agreement with the Golconda people to treat their ore up to a certain per cent for less than $1 a ton. The new plant will cost about $100,000 and will be capable of treating a large amount of ore daily. The Columbia M. Co. has also tested this process and has decided to put in a 100-ton plant. They shipped a carload of ore to Denver and found this process to be satisfactory.

WASHINGTON.

The Ben Hur people at Republic are running a crosscut tunnel to tap the ledge.——Work on the Admiral is progressing. The face of the tunnel is in good quartz.——Returns on the fourth carload of ore shipped from the Republic mine amounted to 9.85 ounces gold and 6.65 ounces silver, and the value was $207 per ton, which is double that of the first carload shipped in February. The four carloads shipped by this mine have shown increase in values, the first shipments being from the upper workings. The four cars returned values as follows, respectively: $103, $114, $169 and $207.——The Comstock, near Colville, has resumed work and will ship by the first of June.——The Enterprise mine has developed 2 feet of silver-lead ore.——The Bonanza mine has resumed work and is shipping at the rate of one carload per day. The Bonanza mine is down 400 feet and has a width of at least 30 feet of pay ore.——The Lake View Co. is pushing work on the Fannie claim. The ore streak in the ledge is 18 inches wide, and assays as high as $60.80.——Near Camp Sheridan the Polar Star is bonded for $40,000.

BRITISH COLUMBIA.

(Special Correspondence).—H. M. Wright of Seattle has a choice of two options on the Devil's Lake M. Co's. ground on Canyon creek. On one option the vendors receive $4000 cash and 40% of the stock in a new company. The other option is for $30,000 cash for the whole. About $3000 has been expended in partial developments and it is generally believed that a few thousand more will make this one of the best drift gravel properties in Cariboo. The headwaters of the Peace river will be thoroughly prospected this summer—a large number of men from the States are going via Quesnelle. Capt. Black has sold his hydraulic ground in Omeneca to an English syndicate for $200,000.

Barkerville, April 15th, '98.

ALASKA.

(Special Correspondence).—The mushroom metropolis of Skagway is in the throes of a mining boom. Placer location notices are plastered all over town, from the mountain to the wharves, as well as along the course of the river, while numerous dikes, quartz stringers and light stains are adorned with quartz notices even when a pack-train of turkey buzzards would be essential for their successful operation. Men are perambulating with picks and pans and a kind of a lost, vacant look. They are evidently dazed by the distinction between mica, or "Pilgrim gold," and the pure quill, besides being at a loss to know just where to look for the gold. This boom is laying the foundations of many a lawsuit, as in Skagway the locations have been made over those for town lots and take in all of the buildings, including the post-office. To a man up a tree, it looks like an advertising scheme, coming as it does at this time. The Skagway wagon-road is practically completed; the old trail has been repaired and reopened. Dyea is under a cloud on account of the recent fatal avalanche, and it is a favorable moment for Skagway to attract attention to its superior accommodations and make a play for the summer and fall travel over the passes. This belief is not only warranted by the appearance of things, but is borne out by the geological and mineralogical conditions of the surrounding country as far as discovered. There is some hungry quartz in the adjacent mountains, but as far as tested by the writer, it is decidedly low grade, and much of it is as base as many a Klondike mining scheme. Although the formations have been shaken up and are seamed by numerous dikes, they do not appear to contain any mineral centers of note, although the indications are more favorable on the South Fork than upon the North Fork of the Skagway river. If quartz mining ever amounts to anything in this section, it will be through striking something better than anything yet found.

In regard to the placers, some gold was picked up; but, although it was the genuine article, it had the appearance if not the flavor of "salt." Aside from that, a few colors have been found, but for size and value they strongly resemble geometrical points. A stray color or two no more make a mine than a single swallow makes a summer. Even if there were no quartz in these mountains, the erosion of the crystalline rocks composing them would leave a small residuum of gold; and while there is some gold along the river, it is extremely unlikely that it exists in paying quantities. A. THURSTON HEYDON.

Skagway Trail, April 11th, '98.

THE KLONDIKE.

Secretary of the Treasury Gage has been officially notified that the Canadian Government has now established offices on the passes from Dyea and Skaguay, where licenses may be obtained by those crossing the mountains and desiring to engage in mining across the Alaska border in British territory.——A bill has been introduced in the Canadian Legislature to authorize the Government to borrow $5,000,000 for the construction of railways in the province. Of this amount $1,500,000 is for a railway from a port on the northern coast to Teslin lake, the headwaters of the Yukon, thus providing an all-Canadian route to the Klondike.——A cut-rate war has been in operation between the Chilcoot Railway & Transportation Co. and the Dyea-Klondike Co., and rates have dropped from 12 and 14 cents to 8 and 9 cents.——A Lake Bennett, B. C., dispatch, dated April 26, says 3000 people are located there on their way to the Yukon.

UTAH.

The Mercur has uncovered a new ore body in the third vein which is 14 feet wide and of good milling quality.——Two lots of ore from the Martha Washington showed 183 ounces silver, 4 per cent lead and $2 gold per ton.—— Work has resumed on the Daisy Dean group at Marysvale, on which ore has been found that shows from $27 to $57 gold.——The *Tribune* says that at North Tintic J. L. Hunter, Mgr. Hot Stuff, which has been under development for two years, will continue drifting with the vein off the 150 level. It was known as the Mammoth of the North, the smelter record showing that the ores averaged 14 per cent copper and $5 gold per ton, with 43 per cent iron.——The Utah mine shipped fifteen tons of ore that showed 178 ounces silver and 42 per cent lead to the ton.——The Mammoth mill is dropping forty stamps.——The Cleveland will prospect its ground off the Sioux-Ajax tunnel.——Twenty-nine bars of bullion, containing about 60,000 ounces, were sent out from the Eureka-Hill mill last week.——A majority interest in the Old Fred mine at Mercur has been sold to B. T. Lloyd and associates of Chicago for $80,000. The property has three veins, one of which is 60 feet wide, and upon which drifts have been run 300 feet. ——The Blue Mountain Co., near Monticello, have a vein 25 feet wide containing a 6-foot streak of silver ore. Assays show 137 ounces in silver and $5 gold to the ton.——The transactions in the ore market at Salt Lake last Saturday amounted to $25,431.——The shipments from Tintic last week comprised eighty-one cars of ore and thirty-two cars of concentrates.——A test run on the Ontario tailings at Park City is satisfactory and it is thought the several thousand tons that have accumulated can be worked at a profit.

The monthly output of the Bullion-Beck is 1000 tons per month.——In the Alpha at Deer creek a 30-inch vein has been found that assays $10 gold and 2⅔ ounces silver per ton. ——The Lizzie Dean group is producing some good grade silver and lead ore.——In the Treasure Hill, near Silver City, sinking has begun from the 600 level. The company shipped ten cars of ore.

IDAHO.

Three veins have been struck in the Lucky Boy tunnel, near Idaho City, which is 640 feet long. The first vein, 14 inches wide, was struck after running in 600 feet. This vein will mill $40 or $50 a ton. A crosscut was run and another vein struck, 4½ feet wide, that will mill $12 a ton. From the face of the tunnel another crosscut was run, cutting another vein, 4 feet wide, of $4 ore. These veins are nearer together than they were in the old works, 150 feet above. The Lucky Boy is under bond to J. B. Reno, W. B. Neal and J. K. Fleming.——G. S. Anderson has secured a bond on the Gettysburg group of claims, near Mullan, and work will be done on the property soon. The group embraces the Gettysburg, Gettysburg Fraction, Independence and Helena Fraction, situated east of the Evening, and the You Like, two of the greatest mines in the Cœur d'Alenes. The consideration for the entire group is $51,500.—— W. B. Wickham is arranging to start the cyanide works on the Gold Belt mine at Hailey. The capacity of the works will be increased to the fullest extent permissible by the water supply.——The Idaho Con. M. Co., at Warrens, has done 50 feet of work since Jan 1st.——The Goodenough is opened to a depth of 300 feet and has a large amount of drifts. This is the deepest work in the camp. The Goodenough has a 5-stamp mill. It made a short run last fall and took out some $7000.——The Honest John Co. owns the Iola group, which is extensively developed, having about 1500 feet of work done. It is 200 feet deep.——The Bedrock Flume Co. has had a force at work prospecting during the winter. They have cut the channel and found it rich, and work is to be begun at once on the flume, which will be two or three miles in length. The company will invest about $100,000 in putting in its works. It owns 200 acres of ground on the meadows below the property of the dredge company.——The dredge company, a Philadelphia corporation, is planning to put in a different plant.——Gambs & Wood have a bond on the Charity claim and are developing the property.——The Poorman mine, near Florence, penetrated a ledge measuring between 12 and 15 feet in width in their tunnel, which is being driven beyond the 500-foot mark. Assays as high as $300 were had, which will average between $50 and $60 for its entire width.

The Potosi mine at Silver City has seventy tons of ore ready for crushing.——The Queen mine at Neihart has found a new ore chute from 14 to 20 inches wide of high grade. Twenty-five men are employed in the mine. ——The Badger mine at Grangeville contemplates the erection of a large hoist.

MONTANA.

Among the mining deals near Butte is the reorganization of the Monitor M. Co., owning the Monitor tunnel, 1400 feet long, and about ten claims in Park canyon. The reorganized company is composed in part of Butte men, but principally of Chicago capital represented by Mr. Pomeroy. A shaft will be sunk on one of the properties belonging to the Monitor Co. a depth of 500 feet.——J. Patten of Garnett shipped five carloads of ore from his claims of a high grade and nets about $2500 to the car. He has about twenty cars on the dump.——The work of further development on the Inter-Mountain mine, near Garnett, continues with encouraging results. A large body of good grade ore has been blocked out since operations on the property were resumed a month ago.——J. Connolly shipped a carload of gold rock. The shipment aggregated thirty-seven tons and yielded a good return.——At Neihart Jennings & Co. are at work on the Whippoorwill and have twenty-five tons of ore on the dump which, besides silver, runs well in lead and copper.——At Barker the Tiger mine made its initial shipment.——The Liberty is extracting good ore. The Wright and Edwards and Moulton are also among the producers.——D. H. Steele is again at work on his long tunnel near Rochester. After running for nearly 1000 feet through comparatively barren ground he is entering ground which indicates the approach to a body of ore.——Mr. Alderson, near Red Bluff, has the Mohegan mill at work again treating tailings.——F. A. Heinze has leased and bonded the Cora mine in East Walkerville for $90,000 for six months. The new operators are already at work and will erect necessary machinery. It is developed by two shafts, one 600 feet deep, since caved, and another shaft of 200 feet.

The Big Seven mine, near Neihart, employs twenty men and ships five cars of ore per month. The property is a gold and silver producer and has been under development for eighteen months. It paid four dividends last year and three since Feb. 1st, the last one amounting to $36,000.

SOUTH DAKOTA.

A vein of copper of good value is said to have been discovered in the Great Northern mine at Two Bit.——At Terry the Golden Reward is working 100 men, most of them in the Tornado and Ruby Bell.——The Horseshoe is working seventy-five men in the Mogul and taking out high-grade ore.——The Delaware shaft is down 325 feet and is working twenty-five men.——There are five outfits at work in the gravel beds near Mystic. They have sunk shafts to bedrock, the deepest place being 37 feet, and have in large machinery, and are meeting with success.——Sullivan & Co. from the Durango mine, on the Lead City divide, last week shipped two cars of ore to the Kansas City smelter that will average $100 per ton in gold. Assays have gone $165 per ton. The ore shoot from which the product was taken is 40 feet wide and 3 feet thick.

COLORADO.

Two carloads of ore shipped from the Birch lease on the Mary McKinney, Cripple Creek, netted $5700. A like shipment is now at one of the local smelters that will run higher.—— Considerable good ore is being mined in the different leases in operation on the Dante. In the Reed and Phillips shafts crosscuts are being driven at a depth of 450 feet. There is a good body of ore in the 300 level, which is being stoped.——Vaughn & Christian have cut at 375 feet depth the blind vein that was opened at 270 feet in their block on the Hull City placer, and find it carrying good ore, making the third producing level upon it.—— The Pharmacist is getting rich ore in the bottom levels, and the development in the new shaft promises to largely increase the revenues during the coming year.——The Union Co.'s territory on Bull hill is being operated by lessees and is producing ore regularly from four shafts. The company is engaged in sinking the Orpha May shaft to a depth of 800 feet, where a new station will be cut and drifts and crosscuts run to prospect the vein. It is down 750 feet. From the Porcupine shaft a shipment was sent out last week that went at the rate of $163.40 for the first grade and $33.80 for the second grade. From the Pike's Peak shaft there was one shipment of a little less than five tons of low grade that went $20.——Nolan & Co. are making regular shipments of ore mined on the Lelia. In places the ore body is 3 feet wide. It averages about $50 per ton.——Peterson & Co. sent out a shipment that went $60 per ton. At this lease there is quite a body of ore running from $10 to $15, but it hardly pays to work. ——In the eighth level on the old Portland vein and chute some rich ore is being mined. The body is fully as wide and as rich as in any of the upper workings. Four different ore chutes have already been opened at this level, and two more are known to exist and will be entered as fast as drifts and crosscuts can be run. In one of the chutes that is now being worked at this point there is a stratum of sylvanite 3 inches wide of high grade. Assays run as high as $3000 per ton. The output at present is eighty tons per day.——Whiteside & Stark are producing ore at the rate of about five carloads per week that has an average value of $60. The high grade is being saved for a separate shipment.——A new find has been made on the south end of the Modoc. The first shipment assays $50 per ton.—— Royalties from the leased block are more than meeting the expenses of operation and development work being done by the Union G. Co. The Orpha May shaft has been sunk 150 feet from the 600-foot station, but the management has decided on going to 800 feet before crosscutting for the vein.——Putnam Bros. are sacking the bonanza stuff opened in their Pointer, and the showing for the mine is big. It is in the formation that has produced the big mines of the district, but in a locality that has so far revealed nothing of great importance.——Hemenway & Jenkins sent out a twenty-ton shipment of five-ounce ore from their Longfellow.——At the Modoc the usual output of thirty tons of high grade ore was made last week.——A strike has been made by Jones and others leasing on block No. 1 of the Specimen, which promises to become one of the big things of that portion of the hill. Drifting at the 200-foot level, a narrow streak has widened out to nearly 3 feet, that runs without sorting at the rate of $60 per ton.

Killum & Ogilvie are shipping about fifteen tons per day that has a gross value of close to $1000. The drift at the second level is still being extended. The grade of the ore is fully as good as in the upper workings.——The chute on the Birch lease of the McKinney lease is nearly 300 feet in length. The pay streak is not wide, but the ore runs from ten to twelve ounces a ton. The output for April was about eight cars, and it is believed this will be doubled in May.——Two deals for Cripple Creek properties were closed for the Battle Mountain Con. Co. by which the company becomes possessed of the Uinta tunnel and a controlling interest in the Arequa G. and S. M. Co., owning the Trail and Big Banta groups on Battle and Bull hills, and the Battle Mountain Co. at the same time takes the field against the Portland in the suits instituted against J. Doyle. There are other matters involved that, aside from the $200,000 the transactions represent, go to make them the most important sales that have taken place in years. J. Doyle has sold to the Battle Mountain Co. a control of his stock in the Uinta Tunnel M. and T. Co. on a basis of $150,000 for the property. He retains a portion of the stock and continues as president of the company.——The purchase of the control of the Arequa Co. was made from E. M. De La Vergne of the Raven, on the basis of $65,000. The Battle Mountain Co. through this purchase gains possession of thirty acres in the heart of the district. The properties of the company are the Big Banta, Old Ironsides, the Trial and Lost Fraction. There are three shafts on the Trial and one on the Big Banta, which have produced good ore, and they rank with the promising partially developed ground in the district.

The Johnstone lease on the Republic at Cripple Creek is producing from $1200 to $1600 a day, the shipments averaging twenty tons and the ore running from three to four ounces. ——Hoffman & Co. have been sending out a carload of ore a day from their lease on the Zeolite and are getting more rock than they can conveniently handle with the present equipment.——The Belle of the West Co., a Chicago company, has decided to enlarge its operations, put on a steam plant and erect a mill for the treatment of its ores. Supt. C. C. Burch reports a considerable amount of mill dirt in a vein 40 feet wide.——The Gold Sovereign is shipping high grade mineral from four shafts. A seven-carload shipment was made that went $70 for the low grade and $136 for the first grade.——Some rich ore is being mined on the Garfield Con. There is a seam of ore from 1 to 3 inches wide. The property is producing at the rate of about $1000 per day.——Whiteside & Stark are getting out one carload of ore per day, averaging from $35 to $40 per ton.——Bodfish Bros. sent out a two-ton shipment running $376 a ton. ——The McDowell lease on the Venezuela is making regular shipments, sorted into two grades. The first class runs about $150 and the low grade $40 ——Ryan & Hanley made a two-carload shipment from the Excelsior, running from $250 to $350 per ton.——Ogilvie & Co. made a ten-ton shipment from the Mountain Beauty, estimated at from three and one-half to four ounces a ton.——Murray & McCormick average four tons of $50 ore a day from the Mattie D. of the Ingham.——Anstie & Von Hemert, in their lease in the Jefferson Co., opened a chute in the 300-foot level from which they have sent out a gross value of ore up to $30,000, the royalties netting the lessees $17,000. One carload sent out in three grades ran $800 for the first grade, $480 for screenings, and the lowest grade ran $100 a ton. The last car ran $108, and they are still netting $1000 a day.——A shipment from the Lafayette at Georgetown yielded 186 ounces silver, 7 per cent lead and one-tenth ounce gold per ton.——From the Bullion at Argentine a shipment returned 288 ounces silver, 36 per cent lead and 16-100 ounces gold.——The Specimen Co. at Cripple Creek has a 4-foot vein of $60 ore. A forty-eight-ton shipment of different grades yielded $2325.—— A twenty-two-ton shipment was made from the Water Ditch shaft on the Pharmacist that run four to five ounces to the ton.——The Gold Dollar, on Beacon hill, is hoisting at the rate of five tons of two-ounce ore a day. This does not include the high grade sylvanite quartz being saved for a separate shipment. ——W. S. Stratton is not shipping heavily from the Independence this month. Enough ore is being broken in running drifts at the different levels to meet the payroll.——Ogilvie & Co. made a twenty-ton shipment from block 2 on the Mountain Beauty. Assays indicate a value of $60.——The ore production of Liggett & Co. on the Garfield Grouse averages $800 per day.——Shipments from the Fluorine are showing a steady increase in value. The shipments for the past week from Copper Mountain have been as follows: 76,840 pounds of ore averaging $35.58 per ton; 38,610 pounds averaging $72.20 per ton; 34,404 pounds averaging $61.50 per ton; 62,584 pounds averaging $46.40 per ton. The whole shipments

amounted to 106 tons having a total value of $12,842.03. The ore is increasing in value. Last month it ran $30 per ton. This month it has averaged $49 per ton.——The Moon-Anchor properties are keeping up their regular shipments. The company sent out 120 tons of smelting ore and sixty tons of milling ore.

The dividends declared for April in Cripple Creek by ten mines amounted to $201,500. The total dividends paid by these properties is as follows: Portland, $1,402,080; Elkton, $516,960; Strong, $350,000; Moon-Anchor, $171,000; Anchoria-Leland, $126,000; Golden Cycle, $130,000; Lillie, $80,110; Gold Coin, $60,000; Eldorado L., $6000; Vindicator, $37,500. ——At Leadville the Fanny Rawlings is doing development work at the 560-foot level. ——The Big Four gold mine is shipping each month a gold-copper ore carrying from two to five ounces gold, 5 per cent silver and some copper.——The Bimetallic smelter is running two furnaces on copper matte. The Ibex mine furnishes the smelter 140 tons daily of copper sulphides.—— The Dollie B. is increasing its daily shipments. A 1500-gallon per minute pump will be placed in the mine this spring.

NEW MEXICO.

The Klondike mine, near Elizabethtown, is running three shifts, taking out milling ore. ——W. F. Doty opened a body of ore that runs $20 to the ton near Red river.——The recent strike in the Moreno at Elizabethtown runs over $200 to the ton.——The cyanide mill at Hematite is completed and has a capacity of fifty tons per day.——The Independence mine, near Red river, has an 8-inch vein of ore that runs $50 to the ton.——In the Iron Dike mine, near Taos, the vein is 3 feet and gives an average value of $7 per ton.

The Taos M. & M. Co., at Colfax, purchased the Black Copper mine for $16,000.

ARIZONA.

The Yuma *Sun* says the Sultan Bros. finished a test run of 160 tons of ore from their Badger mine and the result was highly satisfactory.——A mill will shortly be put in the Turning Point mine, near Casa Grande, Pinal county, in which large bodies of gold and silver ores are being opened up.——Near Frog Tanks, Yavapai county, a 30-ton smelter will soon be erected, to be increased to 100 tons by Oct. 1st.——Work has been resumed in the Pinto Creek, Gila county, group of ten claims, belonging to the Pinto Creek M. & M. Co. The ore body carries good values.——O. B. Hardy, of the Planchas de Plata M. Co, and J. A. Straith purchased the Mahoney group of mines near Nogales.——The 50-stamp mill of the Mammoth mine, near Tucson, has started up. The ore body in the Mammoth is 52 feet wide, and 4825 feet of drifting has explored the property. The mine is producing 175 tons of ore per day.——The Temple Bar Co. is doing extensive work on the Colorado river, in Mohave county. About sixty men are employed, and, as soon as a cleanup has been made, other companies will probably start work and extensive hydraulic operations will be carried on.

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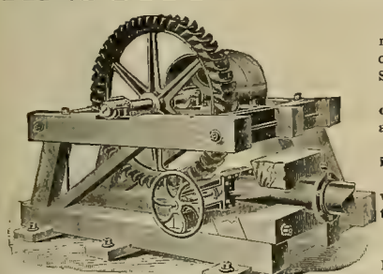
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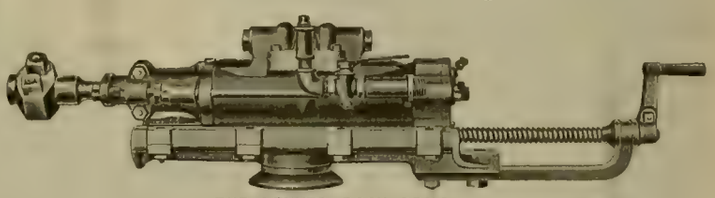
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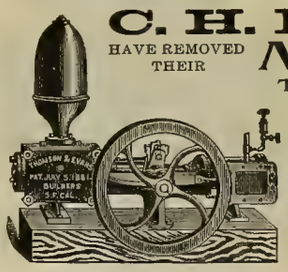
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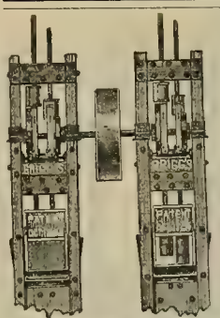
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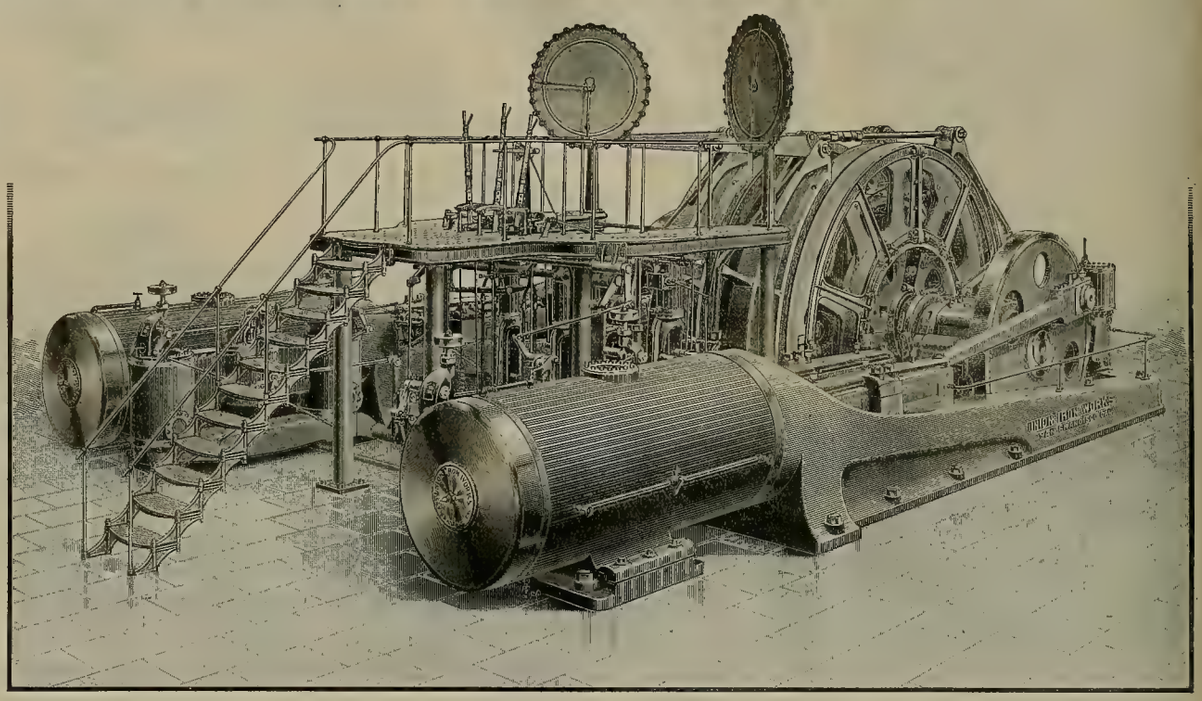
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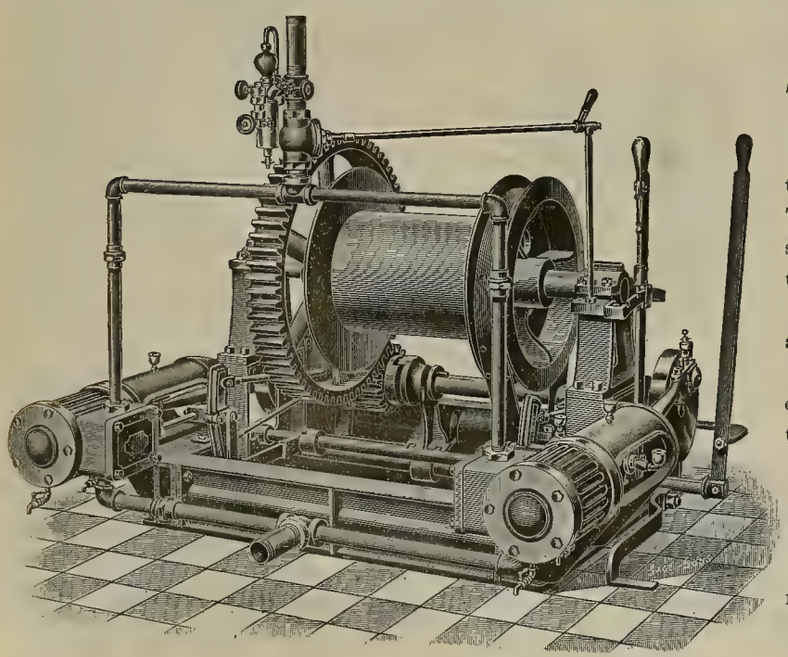
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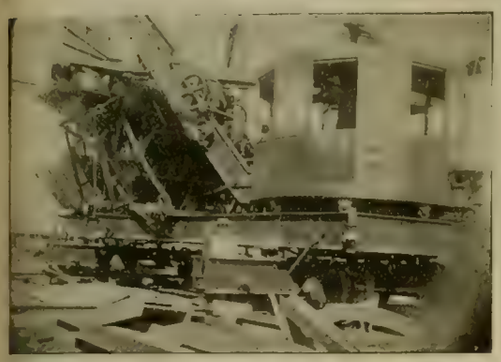
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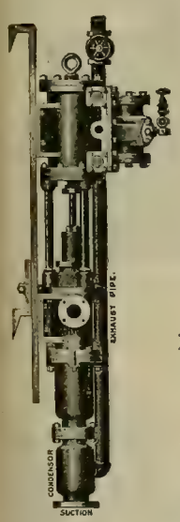
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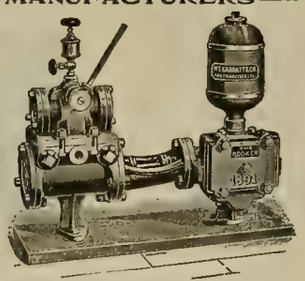
Number	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
4...	2500	2 to 4	Barge	250 tons	Single amalgamator
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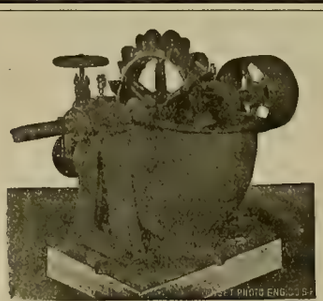
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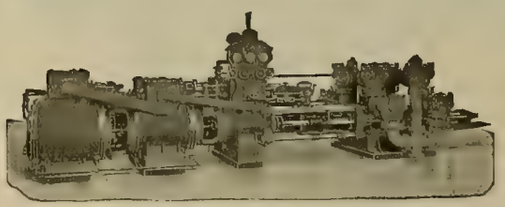
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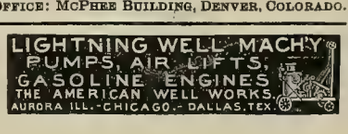
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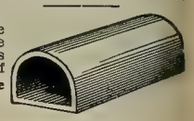
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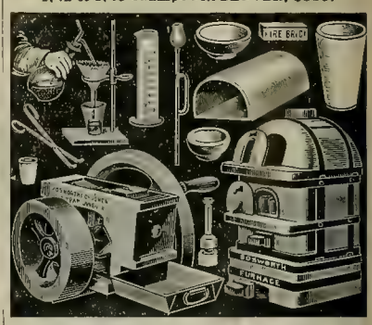


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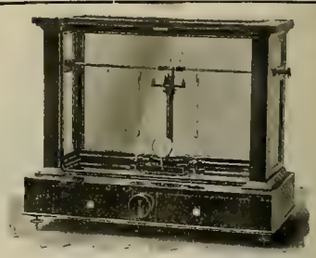


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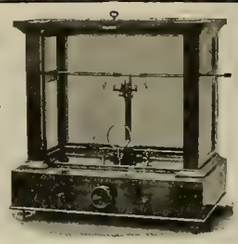
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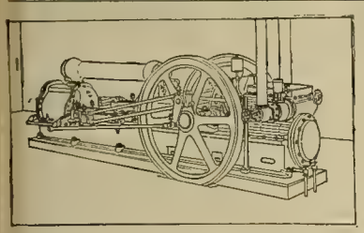
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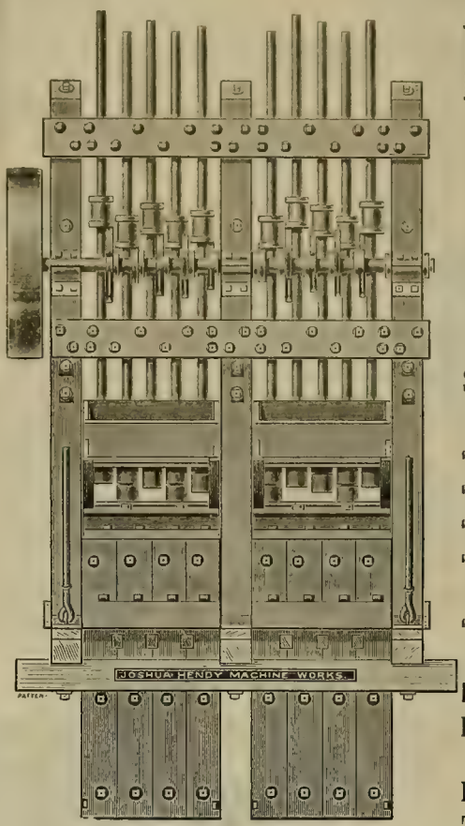
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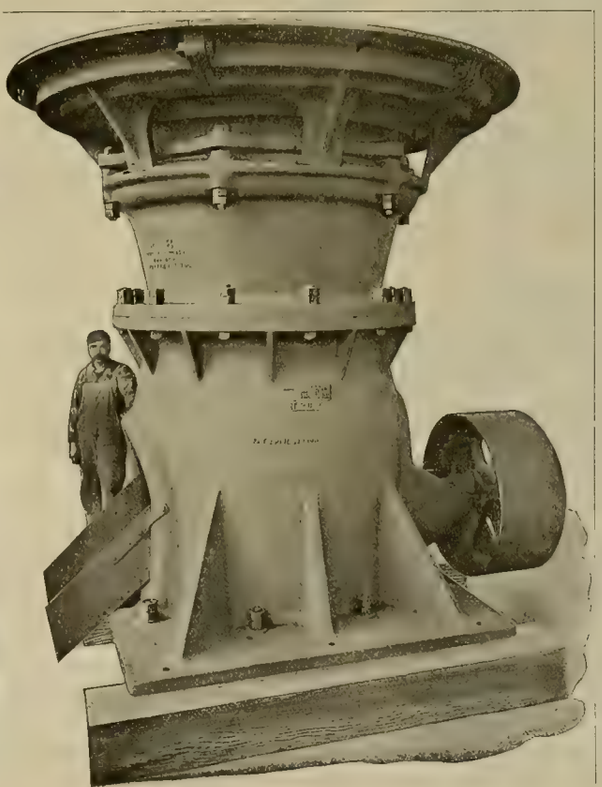
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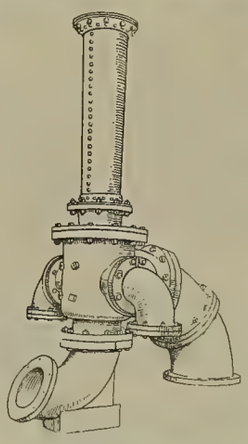
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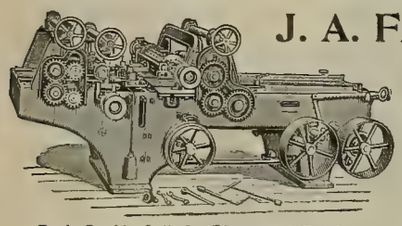
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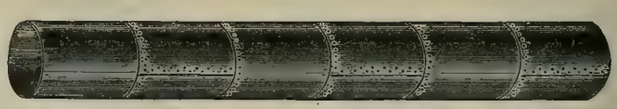


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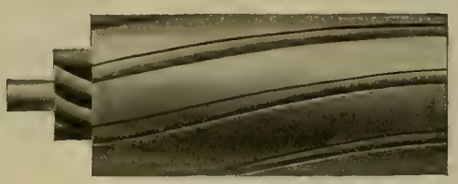
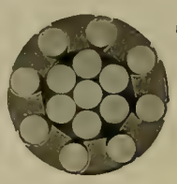
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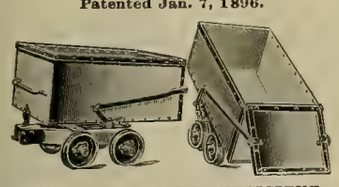
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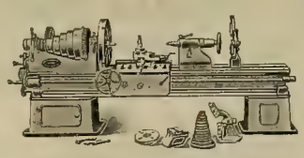
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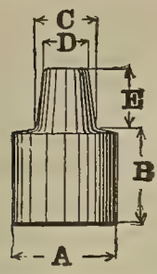
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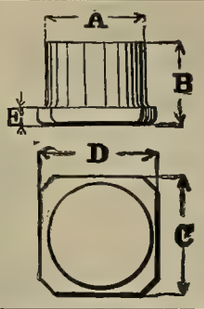
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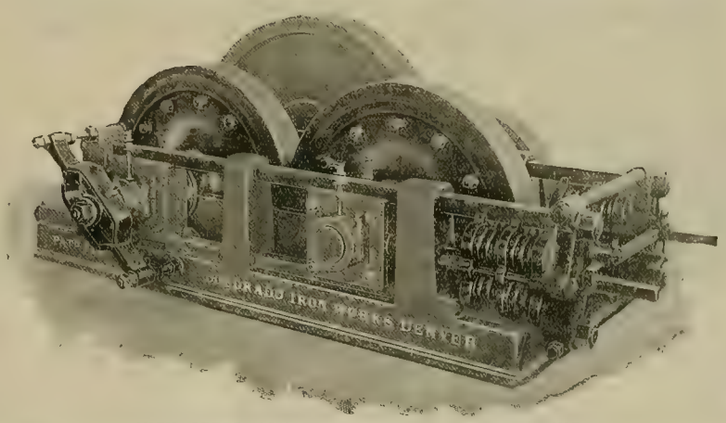
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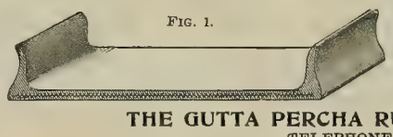


FIG. 1.

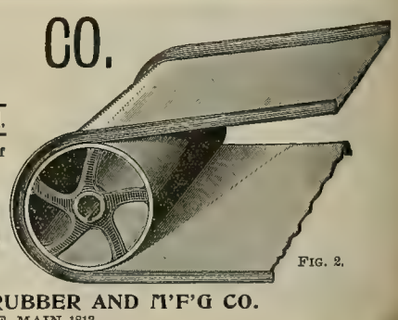


FIG. 2.

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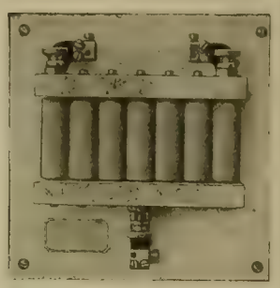
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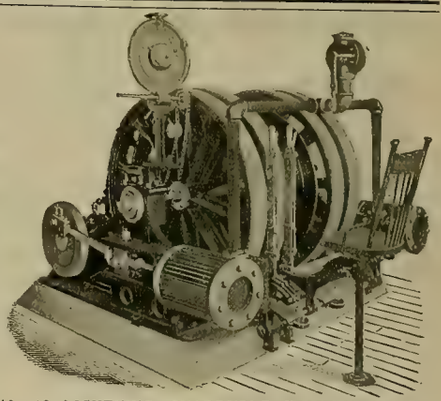
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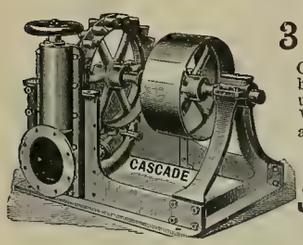
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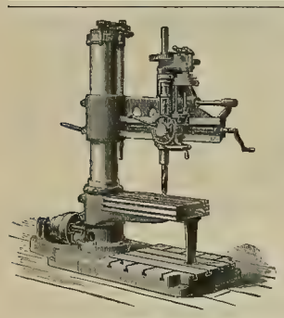


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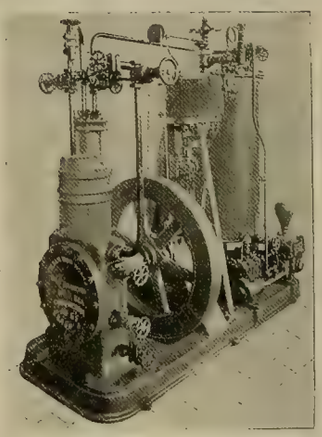
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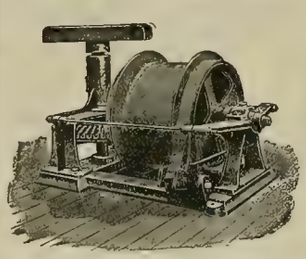
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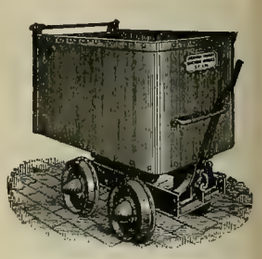
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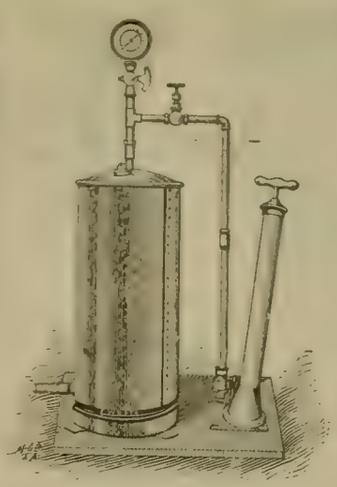
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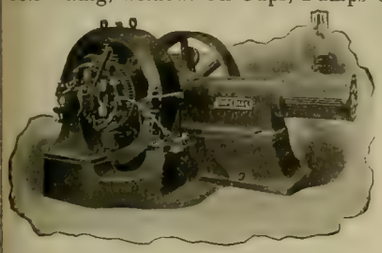
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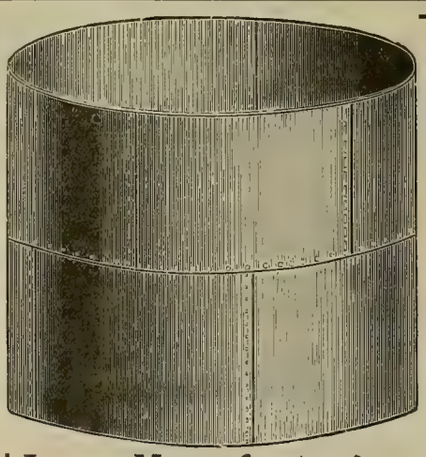
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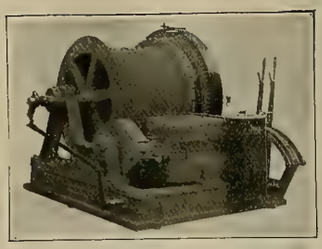
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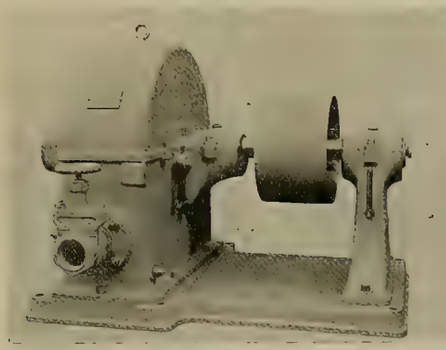
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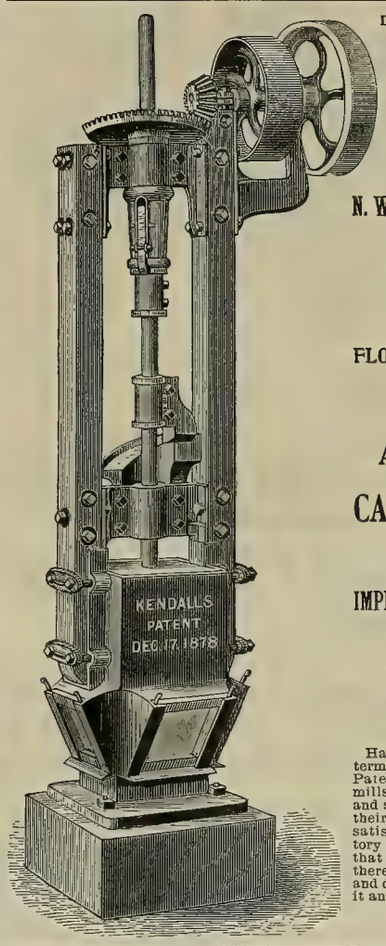
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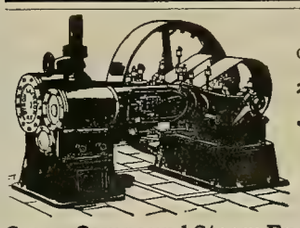
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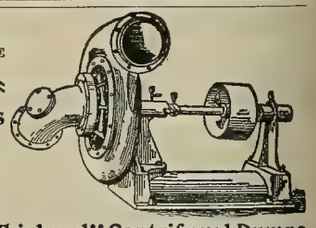
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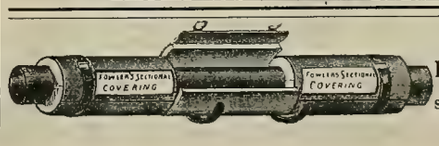
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Market Reports.

The Markets.

SAN FRANCISCO, May 5, 1898.

Prices are steady throughout, with an upward tendency. Possible war effects were discounted thirty days ago by the certainty of conflict. Paradoxical are some of the opinions as to futures. An eminent financier asserts that Dewey's smashing of the Spaniards at Manila "will be followed by a rise in European securities, including the Spanish, because this would mean an early end of the war, and therefore we should look for an advance on all the bourses and exchanges of the world." It now takes 100 Spanish paper pesetas to purchase 40 gold ones. This gives an idea of the scarcity of gold in Spain, and the premium on the same when it is to be obtained, as well as indicates the very low ebb at which Spanish credit and securities are at the present time. It is, however, a curious commentary on Spanish finances when disaster is expected to boom its securities. New York reports that the conferences between Secretary Gage and bank presidents this week has had an indirect effect upon the market. Confidence was expressed both by bankers and by the Secretary that the Government would have no difficulty in placing 3 per cent bonds at par or better. There had been some anxiety lest the Government might think it necessary to make a 3½ per cent bond in order to make sure of a quick market for a large issue. A 3½ per cent bond would, it was thought, have disturbed the status of bonds lately issued for refunding and reorganization purposes. This fear has been dissipated to a large extent.

Silver is quoted to-day, locally, at 56c; London, 26d; New York, 56⅛c. The latter city reports a steady foreign demand for copper. Lake copper continues to be quoted at 12⅜@12½c. Other metals are unchanged. Locally they are quoted as follows: Pig Iron, $19.00@22.00 per ton; Tin Plate, $4.25; Yellow Metal, 13¾c; English Cast Steel, 14@16c; Sheet Zinc, 8½@9c; Pig Lead, 5c; Bar Lead, 5½c; Lead Pipe, 5.30@5.80c; Sheet Lead, 6@6½c; Pig Tin, 16c per lb. Nails are $2.00@2.25 carloads, $2.25@2.50 small lots. Quicksilver for local consumption is held at $40@41; powder, No. 2 dynamite, 9½@10c; black, $1.25 per keg. Coal, wholesale: Wellington, $8 perton; Seattle, $6; Bryant, $6; Coos Bay, $5; Wallsend, $7.50; Cumberland, $10.25 in bulk; Pennsylvania Anthracite Egg, $14; Cannel, $10; Rock Springs, Castle Gate and Pleasant Valley, $9; Coke, $12 per ton in bulk and $14 in sacks.

Mining Share Market.

SAN FRANCISCO, May 5, 1898.

War and wheat have drawn speculators and brokers into other channels. The prospective beginning of unwatering the deep Comstock levels through the Yellow Jacket shaft and the favorable official letters justify a firm market. Considerable development work goes on, and the conditions at the mines are not fairly reflected by present street prices. The San Francisco and Pacific board rooms are doing little or no business, some of the old-timers consoling themselves with the reflection that stocks can't go much lower and bring any price at all. To-day's prices were a little firmer, about 2200 shares being sold at the morning session in the San Francisco board room. Supt. Boyle of the Alta mine, who recently inspected the ore development above the Riley tunnel of the Sierra Nevada mine, says there is a breadth of 14 feet exposed in the ore breast that averages $60 per ton, and considers the indications strong for its downward continuance.

Last month the mining and milling companies on and around the Comstock lode paid $57,417 to employes. Detailed disbursements were as follows: Andes, $900; Con. Cal. & Va., $7738; Ophir, $2144; Mexican, $1752; Best & Belcher, $2337; Gould & Curry, $2390; Utah, $840; Occidental, $1800; Alta, $2400; Brunswick lode, shafts Nos. 1 and 2, $6077; Crown Point, $593; Belcher, $2894; Yellow Jacket, $1866; Confidence, $251; Challenge, $251; Imperial, $427; Seg. Belcher, $258; Savage, $2520; Chollar, $1952; Bullion, $424; Potosi, $2430; Union shaft, $2421; Sierra Nevada, $1155; Alpha, $717; Overman, $1000; Caledonia, $500; Nevada mill, $880; water company, $3000; quartz mills, $5000.

Copper stocks make good holdings. J. G. Martin, in his "One Hundred Years' History of the Boston Stock Market," says, regarding the Calumet & Hecla mine: "On Jan. 1, 1868, the stock of both the Calumet and the Hecla was quoted at $30 per share, and this included all the assessments levied—$15 on Calumet and $25 on Hecla. A purchase of 100 shares in either at $30 would have cost $3000, and this since increased to 250 shares is now valued at $530 per share, or $132,500, giving a net profit on stock of $129,500. During this time the dividends paid were $131,250, making the net value in 1898 of original investment $260,750."

San Francisco Stock Board Sales.

SAN FRANCISCO, May 5, 1898.

9:30 A. M. SESSION.

100 Alpha	03	300 Mexican	11
200 Best & Belcher	29	100 Ophir	41
300 Chollar	26	100 Sierra Nevada	64
100 Con Cal & Va	61	200 Union	16
500 Con Imperial	01	300 Yellow Jacket	07
100 Crown Point	10		

SECOND SESSION—2:30 P. M.

800 Alta	17	300 Mexican	12
400 Belcher	11	500 Ophir	41
800 Best & Belcher	29	700 Potosi	26
900 Bullion	07	600 Savage	15
200 Caledonia	16	400 Sierra Nevada	64
1200 Chollar	26	800 Union	17
300 Gould & Curry	23	1000 Yellow Jacket	07

Assessment Notices.

RED CAP MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Red Cap Creek, Humboldt County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of April, 1898, an assessment (No. 3) of two dollars per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, 125 Beale St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 27th day of June, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. H. MARTIN, Secretary.

Office—125 Beale St., San Francisco, California.

DELINQUENT SALE NOTICE.

TUBER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Panamint District, Inyo County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 22nd day of March, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Zerah Castle	8	6,250	3 125 00
Hugh McDonnell	17	1,000	500 00
Hugh McDonnell	18	1,000	500 00
J. W. Pew, Trustee	74	12,484	6,242 00
Nat Stein, Trustee	75	8,317⅓	4,158 33
Nat Stein, Trustee	76	8,317⅓	4,158 33
Nat Stein, Trustee	77	14,500	7,250 00
W. Sheldon, Trustee	78	12,484	6,242 00
J. W. Pew, Trustee	79	18,733	9,366 50
Nat Stein, Trustee	80	16,749	8,374 50

And in accordance with law, and an order from the Board of Directors, made on the 22nd day of March, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on THURSDAY, the 2nd day of June, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

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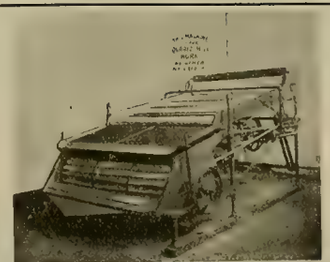
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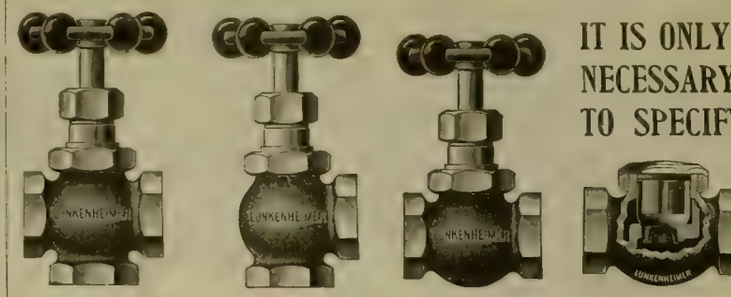
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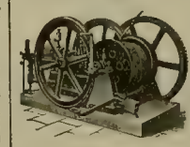
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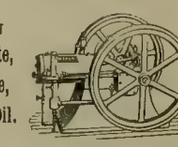
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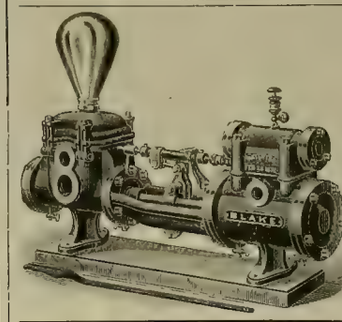
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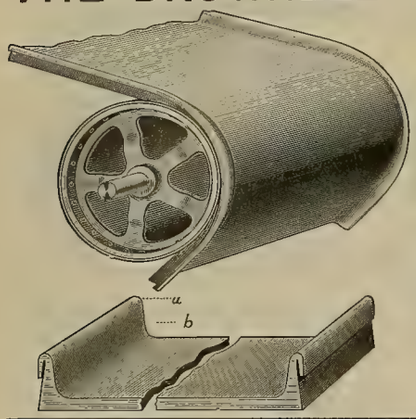
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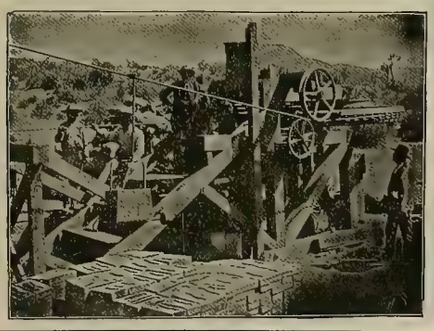
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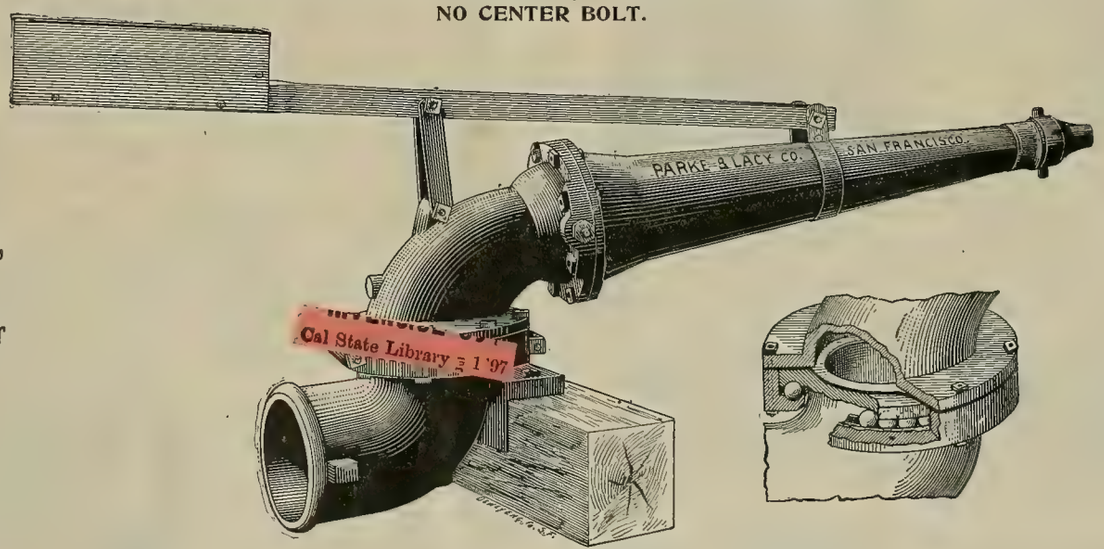
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No. 1975.—VOLUME LXXVI. Number 20. SAN FRANCISCO, SATURDAY, MAY 14, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Spenceville, Cal., Copper Mines.

The Spenceville copper mines are 120 miles from San Francisco, 17 miles from Grass Valley, 450 feet above sea level.

In the winter of 1862-3 copper ore was discovered at Spenceville. The region was found to be traversed by copper veins, and on one of these (now the Spenceville mine) a vertical shaft was sunk, reaching a solid body of copper ore. The property came into the possession of the San Francisco Copper Co. about 1875, and was worked by them for thirteen years. A vertical shaft was sunk 180 feet; two crosscuts were run at depths 60 and 100 feet and a level opened at a depth of 150 feet, all in ore. Costly experiments were made. A smelter was erected to refine cement; a flue built of brick and stone 1000 feet in length to carry off sulphur smoke; seventy-five men were employed; the ore taken out of the mine was roasted and leached, and about 46 per cent only of the copper it contained was extracted. The residue accumulated in a dump, which now contains about 150,000 tons. Owing to insufficiency of underground timbering, in August, 1880, the mine caved in, carrying away hoisting works and machinery. This was a heavy loss to the company. Prospecting was never resumed; only the ore in sight was taken out, and the mine was worked as an open cut. In 1890 a large area of ground on the hanging-wall side caved in, forming a pit 200 feet in length, from 30 to 80 feet in width and 80 feet in depth. By this slide were exposed about 2000 tons of good copper ore, and there was also exposed a large vein of iron pyrites 30 feet in thickness. After the cave, peacock or smelting ore from the hanging-wall was taken out, which showed 19 per cent copper.

By the caving in of ground on the hanging-wall side a large body of ore was exposed, but no ore was extracted. Work in summer was confined to hoisting from this pit the water which contains copper, and which has accumulated from the rainfall and the natural flow of water. In the winter the outside of the dump was worked by leaching. There was also manufactured from the tailings of the dump (after all the copper had been extracted) metallic paint.

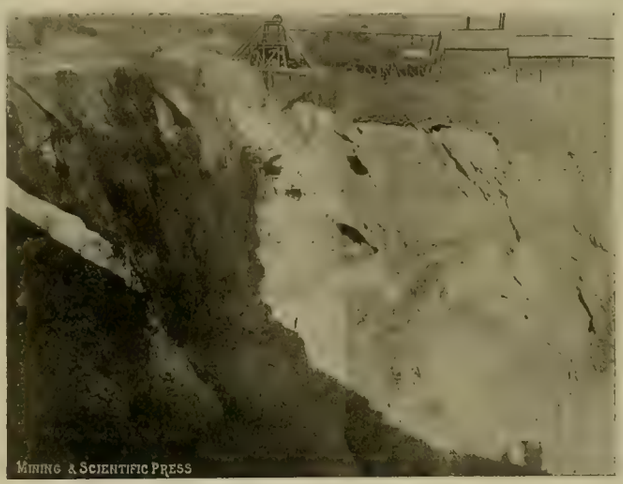
The ore dump is what is left by the old company after leaching the partially roasted ore, 60 per cent only of the copper having been extracted. In length it is about 200 feet, depth from 20 to 80 feet, average width on top 200 feet. It contains about 150,000 tons.

In concluding a report on this property many years ago, Thos. Price of San Francisco said: "There is every indication that the deposit will prove to be a permanent one, and systematic mining may develop seams of rich ore. I assayed a sample from a streak near the hanging-wall shaft that yielded 14 per cent copper; and as early as the year 1863 I purchased considerable ore from this mine that assayed over 20 per cent copper. I have no doubt but that in depth you will again encounter similar bodies. In addition to the copper pyrites, there is a seam of iron pyrites, at least 15 feet in width, that assays from 45 to 48 per cent sulphur. In the future, such material will be worth from $9 to $10 per ton in San Francisco for the manufacture of sulphuric acid. Deposits of copper pyrites containing a less percentage of copper than does your deposit are being worked in other parts of the world at a profit, and I can see no reason why yours could not be worked with a profit."

During the summer the water in the large open cut or pit, which accumulates from the winter rains and the drippings of the ledge, is hoisted by steam in a bucket of a capacity of 200 gallons, and is emptied into two large settling vats or solution reservoirs. The bucket fills and empties itself automatically. From these vats the water runs through a long sluice-box filled with scraps of iron. The copper in the water is precipitated by the iron. The ore dump is worked by the leaching process, water being run onto it, and it being sprinkled on the outside by a small hose. The water running from the ore dump, as a result of this leaching, is a copper solution which is conveyed into the storage vats above mentioned, and thence into the sluice-box, where the copper is precipitated as above described. The copper is cleaned up from the sluice-box occasionally, washed, dried in a drying pan and sacked ready for shipment as copper cement.

After the copper-charged water flows from the vats, the residue of the ore is taken to the paint works, where it is first washed in tanks. It is then air-dried, oxidized in the reverberatory furnace for twelve hours, then milled and placed in barrels ready for shipment.

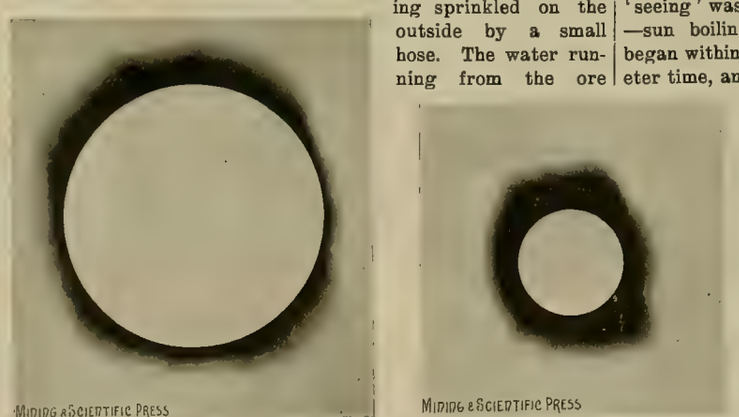
The copper has sold, delivered on the cars, at from 10 to 12 cents per pound. Such copper cement always commands a ready market, and is shipped as far east as New York. Some years ago there was smelted a quantity of this cement, which produced copper averaging 98 per cent fine, which was used by the Union Iron Works in the construction of the United States ship Charleston. This copper was sold for 17 cents per pound. The copper property comprises ninety acres; its present owners are the Spence Mineral Co., under the management of T. J. Wrampelmeier. At present the ore is being shipped to chemical works at San Francisco—fifteen tons per day—where the pyrites are burned for the manufacture of sulphuric acid. The quantity of acid produced from a ton of the ore is about one and one-third tons. When the better quality of ore is shipped, the copper will be extracted from the residue.



COPPER MINES, SPENCEVILLE, CAL.

The January Eclipse of the Sun.

Our readers will remember that on Jan. 22nd, '98, occurred a total eclipse of the sun, observed under the most favorable conditions at Jeur, India, about 250 miles from Bombay. The leading scientific establishments of the world sent representatives. California sent two fully equipped expeditions. Through the courtesy of Prof. J. M. Schaeberle of the Lick Observatory the MINING AND SCIENTIFIC PRESS is in receipt of the original negatives of two photographic observations taken by Prof. W. W. Campbell, (who had charge of the Lick Observatory Expedition), and which are here reproduced. In a letter from Prof. Campbell, written the day after the eclipse, he says: "There had not been a cloud in the sky for six weeks, and eclipse day was simply beautiful. The 'seeing' was fair that day, though it had been poor—sun boiling—on all previous days. The eclipse began within half a second of my predicted chronometer time, and closed in the same manner. No wind existed, though I was prepared for wind. The corona had great extent, but was faint as a whole. The prominences were numerous, but vastly smaller than in '93. The sky was very bright. Animals paid very little attention to the eclipse. Three miles away, on the horizon formed by a low ridge, I saw the small trees with perfect distinctness during totality. * * * There were eight beautiful negatives with the Dallmeyer and with the Floyd. The spectrum of the sun's edge was fainter than I expected, but the plates are successful and valuable. (It is one of each of the above that is herewith reproduced.) I had a great struggle with the dust and the heat in developing the plates. I had to have the dark room in a tent, temperature 94° Fahr. in the daytime. Had to wait till 1 A. M. to begin developing. And the dust was awful, too. The water was absolutely muddy—had to be boiled and filtered. I never saw such dry climate. Some days the dry bulb was + 32° C., and the wet bulb + 18° C., or even + 17° C. My hands were cracked wide open, and I could scarcely finish the development of the original plates, to say nothing of making copies."



THE ECLIPSE OF THE SUN, JEUR, INDIA, JANUARY 22, 1898.

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J. F. HALLORAN.....Publisher

San Francisco, May 14, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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THE Pacific coast has proud part in Dewey's victory in the Philippines. The best of the ships that smashed the Spanish were built in San Francisco and 75 per cent of the men aboard the American ships were from California, Oregon and Nevada.

IT is calculated that since the passage of the Caminetti Act in March, '93, requiring hydraulic miners in this State to build restraining dams for the debris, the total storage capacity of dams and impounding reservoirs so constructed is over 50,000,000 cubic yards.

THE States of Colorado and Utah received an unusual May drenching last week, a good thing for the miners and one in which the California miner would willingly share. The drouth cut short the California gold yield for '97, and will doubtless show a similar shrinkage for '98.

IT is generally stated, though not officially known in this office, that the Commissioner of the General Land Office has made a new ruling requiring $100 worth of work or improvements on each unpatented mining claim for the year in which the entry was made. Heretofore it has been the rule that on a mining claim located say to-day, May 14, '98, the locator had until Dec. 31, '99 to do the amount of work necessary to hold it to that date. If the latest announced ruling be a fact, the $100 would have to be expended thereon by Dec. 31, '98, and $100 for each calendar year thereafter until U. S. patent was secured.

THE U. S. Geological Survey, in accordance with suggestions of California mining engineers, has in the case of Calaveras and Amador counties increased the practical usefulness of the Jackson folio, covering the two counties mentioned, by putting in the Government township projections and inserting therein the surface boundary limits of the various mining claims along the mother lode. This work is about completed, and, it is expected, will be ready for delivery about July 1st, '98. It is understood that State Mineralogist Cooper is having some work done of a similar character in the veins east and west on the mother lode, under the supervision of M. B. Kerr, using the work of the U. S. Geological Survey as a basis, thus completing the work. It is believed that a continuation of such work in all the mineral bearing counties of California would be of immediate and material practical benefit to the miner. Mr. Walcott is in receipt of numerous petitions for surveys from settlers upon lands included in the forest reserves, such survey work having been turned over to his bureau, and desires to reply to all that the subject of surveying such lands will be considered as soon as the bill in which provision is made for such surveys becomes a law.

PRESENT owners of copper mines, producing or giving promise of profitable development, can view the war and industrial situation with complacency. Next to reliable war news nothing is in more active present demand than copper. As with gold and other metals, this west half of America is of prime importance to the nation in this regard. A New York broker says: "During the past three years no shares of any kind of enterprise have shown the remarkable and steady increase in values that the copper shares have. During the past year and a half, eight of the leading copper stocks have increased in value over fifty million dollars and they have increased over twenty million dollars during the past six months. The total par value of their capitalization is only $16,000,000. The Rothschilds and other big capitalists of Europe have agents exploring the entire Western continent for copper properties, and a large number of English bankers and operators have their American correspondents looking up copper mines or large blocks of stocks in such properties for investment purposes. The ownership of all the American copper mines is in the hands of a very few people, and less than 100 American copper mine owners control the world's market for copper. The demand for the metal is greater than the supply, the total visible stock on hand was never so low as now, and would be exhausted entirely in two or three months if the supply was stopped in any way." As things are at present, it looks as though the world needed copper more than gold. It is predicted that copper will sell for 13c before Jan. 1st, '99. It is being produced at a total cost of less than one-half that figure.

TRAVEL to the Klondike, which began last summer, culminated about the 1st of March, '98, and since that date has dropped to one-fourth what it then was. Several transportation companies have lost heavily, and there are now many vessels idly awaiting the rush that was anticipated this spring. The usual exaggerated accounts of rich finds continue to come, but that they are no longer believed is evident. When two or three shipments of gold in any considerable quantity arrive that will doubtless stimulate travel, but the war is the newest sensation and claims the biggest type and greatest prominence in the daily papers. At the Victoria, B. C., custom house the demand for miners' licenses which for awhile averaged 300 per day has fallen off to 25. The letters from those who have had personal knowledge of the hardships and the fatal snowslide at Sheep Camp, beyond Dyea, have almost entirely checked travel via Skaguay or the overland route. It is calculated that there are about 3000 in the vicinity of Copper river, and more than that number still on the way via Skaguay and Dyea. Meanwhile the Yukon route, though longer, gives promise of greater comfort and safety, and it is probable that several thousand will leave Pacific coast ports this summer for the Klondike by way of St. Michaels. The Kotzebue sound country is also attracting attention, and well-equipped vessels are up and loading for that region.

EXISTING CONDITIONS by reason of the prevailing drouth and low water in California make river mining unusually prominent this season. In several instances in northern and central California, where placer mining has been carried on along the banks for years, the bedrock dipping toward the middle of the steam, it has been considered of probable profit to turn the water and work the channel. Wing-damming has been fairly successful; diversion of the waters by tunnel or flume is usually very expensive. Not in the present generation is there a more favorable opportunity than the present for such enterprises, though, as obviously no more than the present can be counted on, enterprises involving large and continuous expenditure will be entered on with caution. The hydraulic gravel elevator has done much to economically aid in this branch of gold mining, and such seasons as the present must result in their increased use. In this regard the same may be said of dredges, which are coming into increased use in California and are winning deserved recognition.

THE Phillippine Islands are good gold producers, and under American control would be an increased factor in the world's annual gold output. The manager of a mining property lying at the east of the China sea, between Borneo and Formosa, said some time ago from Largos: "As a mining country I have never seen its equal; there is gold everywhere. The little streams are full of placer gold and the mountains a perfect network of small ledges, some of them running as much as from four to six ounces per ton; but the people are at least one thousand years behind the times; no work has yet been done here in a systematic manner, and for several reasons it is almost impossible to prospect here. The Government does not give the proper protection to justify any man spending his time prospecting. Another reason is the interior of the islands, which, in my opinion, is the richest portion of them, are peopled with wild tribes of Indians that are almost as ferocious as wild beasts, and no prospecting could be done in their territory unless the prospectors went in large parties; and another reason is that the foliage, which is a regular jungle, is so thick that a man cannot get through it. If any other nation on earth except the Spaniards had this country, it would very soon be the largest gold producing country in the world, but everything is so handicapped that it is impossible to get capital to come in here, and it will take capital to make a success of it. The ore is all high grade, but I am a little afraid it cannot all be successfully worked by the free milling process. I have all the machinery on hand for a 100-stamp mill, and, if it is a success, the company will at once increase their works. They have any amount of ore, and, in this country of cheap labor, they are bound to receive large profits." Now that the United States has acquired that country, it is interesting to note the value of its gold mines and the probability of a new outlet for American enterprise and ingenuity.

INVENTIONS and improvements in mining methods and metallurgical processes are as plenty as ever, only the usual small percentage getting beyond the glowing announcement that the process or discovery is "going to revolutionize" everything in connection therewith. Among the improvements noted this week is that of Supt. Chaumeil of the Compagnie Salines et Mines de l'Altar, in the Altar district, Sonora, Mexico, whose improved dry washer is "working a revolution" in the placer ground of that district. It is locally claimed that the new machine does all the work of a concentrator, "saves all the gold" and "reduces 60 tons of earth to 1," which is interesting. It seems "no gold at all runs off in the tailings. All is saved." In Butte, Montana, Mr. F. Hall has invented a new cyanide process, a prominent part of which is "a secret solution" which has "solved the problem." Mr. Hall says his process "will successfully treat all known refractory ores carrying gold and silver, one or both, including sulphurets, arsenic, antimony, and hard, compact copper ores and iron oxides. I have successfully demonstrated that for acid ores, such as sulphurets, lime is a neutralizer not worthy of recommendation." The further statement by Mr. Hall that Chas. Butters in his cyanide work in Utah, California and South Africa "has failed in every effort he made" will not augment the faith of practical metallurgists in his assertions about anything. The most promising statement of all, however, is contained in the Denver, Colo., *Republican*, which tells of a local genius who is extracting $4 in gold from each ton of coal treated. The technical details of that process would be interesting to metallurgists. If true, this last exceeds in practical interest the evolutions and revolutions of the gentlemen who announce the successful and profitable extraction of gold from sea water. In California it has all along been known that the owner of a coal mine had practically a store of gold, but it is not generally believed that by any process can $4 or any other amount in gold be actually produced from a ton of that valuable vegetable formation.

Sulphur in Demand.

Considerable editorial space has been recently given to the discussion of the production of sulphur. The present war makes the matter one of considerable commercial importance. Thirty days ago New York brimstone was $22 per ton. It is now $50 and upward. It is generally conceded that unless Spain removes the embargo that she has placed on sulphur as contraband of war the manufacturers in this country will raise the price of cheaper kinds of paper. Brimstone is used in large quantities in the manufacture of paper used for newspapers and magazines, and a raise in the price of sulphur would have the effect of raising the cost of production of newspapers to a very appreciable extent. The amount of brimstone in this country at present is small, and there seems at present no indication that the stock can be materially increased. Last year 118,137 tons came to this country from Sicily, and the year before the importation was even larger. The raw brimstone comes almost exclusively from Sicily, most of it being shipped from the port of Palermo. Besides being used by the manufacturers of wood pulp paper, the makers of fertilizers and sulphuric acid are also large consumers of it, while after it has been converted into sulphur it plays an important part in the manufacture of vulcanized rubber, no substitute having yet been found to take the place of sulphur in the making of what is known as hard rubber.

There are sulphur deposits in California, Nevada and elsewhere on this coast. The Humboldt Sulphur Co., of Humboldt, Nevada, is credited with present ability to furnish the local market with sulphur in profitable competition with Sicily or Japan. The Denver Chemical Works report their intention to build a plant for the manufacture of brimstone, from the Vulcan mine in Gunnison county, in which a 4-foot deposit is reported discovered.

In Lower California are also extensive sulphur deposits, which are now being developed. Considerable has been shipped to the refining plant at Ventura, and it is now proposed to establish a refinery at the mines. The surveys on the proposed railroads have been completed to Yuma in one direction, and the engineers are now at work on the coast route.

The McKinley tariff law admitted crude sulphur free, but charged $20 per ton on refined sulphur. In Sicily the sulphur ore as mined contains only about 3 per cent of sulphur. This is refined to about 96 or 97 per cent and is then brought here as crude sulphur and admitted free. The Salt Lake, Utah, *Tribune* editorially says it knows of one bed in Utah where 6,000,000 tons of nearly pure sulphur have been developed and are still there.

In 1896 there were produced in the United States 5260 tons sulphur, valued at $87,200. The estimated consumption of sulphur in the United States for that year was 284,908 tons. During the fiscal year ending July 1, '96, San Francisco imported 6370 tons crude sulphur, or brimstone, valued at $66,934.

DURING the Golden Jubilee Mining Fair in San Francisco last January and February, the writer was asked repeatedly why there was not one exhibit where the whole process of quartz mining and metallurgy could be shown from where men would be employed taking out the ore, to where the bar of gold bullion was on exhibition. The most obvious reason was on account of the necessary hurry by reason of the very short time, the wonder being that so much was done in so short a time. The matter is referred to here in connection with the fact that in accordance with similar suggestion the managers of the International Mining Congress which meets at Salt Lake City, Utah, next July, are now installing a working demonstration of the cyanide process, complete, from mining the ore to exhibition of the bullion therefrom. The idea is an excellent one. While many of the visitors and delegates know considerable about it, yet to a very large proportion the exhibit will be interesting and of value as a practical educator. It is sometimes difficult for practical mining men to realize that thousands are yearly engaging in mining who are unacquainted with the rudiments of many things that they know little about, but who are eager to learn. Recently an old experienced California hydraulic miner made joking reference to some "kindergarten" information herein about flumes and ditches. But while to him such information was unnecessary, and doubtless did seem so, yet among the hundreds of new subscribers monthly added to our lists just such information is eagerly sought. The law of supply and demand illustrates this. A very large proportion of the daily mail received in the business office of this journal is requests for back numbers of recent issues containing information on some subject that, while it may be thoroughly known and understood by many miners, is as new and important to others as it was to the first class when they first learned it. The managers of the Utah meeting have the right idea and deserve commendation for putting it into execution.

Some Questions Answered.

A Coulterville, Cal., subscriber asks "on how short a curve 16-foot lumber can be successfully floated in a V flume carrying 300 miners' inches of water, fall ½ inch to the rod? And on how short a curve if the V flume carried 500 miners' inches of water?"

The question was referred to two leading mechanical and hydraulic engineers, who reply: "As no dimensions of either flume or lumber are given, we have assumed lumber to be 2x12 inches, 16 feet long. This can be floated in a V-shaped flume carrying 300 miners' inches and having a radius of 60 feet to center of flume. If your correspondent will state what size of lumber is to be floated and shape and size (also whether 90° or not) of flume, together with quantity of water, we can tell you exactly curve or radius of flume required."

A Grants Pass, Oregon, assayer sends a half-ounce button of what he styles sulphuret of molybdenum and wants it tested.

In open glass tube the sample gave sulphurous fumes and a pale yellow sublimate. In pincette before blowpipe it imparted a yellow-green color to flame. On charcoal with oxidation flame it yielded circular crystals and white coating, which changes to azure blue with an intermittent reduction flame.

Molybdenite is soluble in nitro-hydrochloric acid, imparting green color to liquid. Evaporate excess of acid, dilute with water and introduce hydrogen sulphide. A blue coloration is produced and a gradually formed precipitate of brownish-black molybdic sulphide. Collect this on filter, dry and place in an uncovered, oblique-inclined crucible over a gently heating flame, where it remains until sulphurous anhydride fumes entirely cease; the yellow residue is dissolved in ammonium hydroxide. Hydrochloric acid added precipitates white molybdic acid, which is again soluble in excess of same acid. Stannous acid added to the hydrochloric solution of molybdic acid gives a blue coloration, changing to green and finally brown.

The ignition of ammonium molybdate produces a gray oxide, which, mixed with sugar and heated in an electric furnace with a current of 350 amperes and 70 volts for eight minutes, produces a button of cast metal. M. Moissan—*Comptes Rendus*, p. 1320, vol. 120—cites the reduction in an electrical furnace of a mixture of MO_2 and charcoal and describes a reaction of fused molybdenum. When nearly pure molybdenum has a density of about 9, is practically as malleable as iron, can be filed and forged when hot. It is believed to be of definite commercial value, and its occurrence in sufficient quantities to justify reduction would doubtless be of financial profit.

M. Moissan (to whose experiments we are indebted for almost all our knowledge of the subject) says that the most remarkable property of the metal is that it can be cemented like wrought iron, forming a "steel," if the term may be used, which can be tempered similarly to iron steel. Having an affinity for oxygen, it is suggested that it may be added to the iron in a converter, replacing manganese or aluminum.

An unusual question comes from an Idaho reader who wants to know how daily newspapers can "copyright" their daily issues. He says if he wants to "copyright" anything it takes a month to get the copyright from Washington. The morning dailies that copyright their several editions do so for a year ahead. On the first day of January of each year they file two copies of the heading of the paper bearing the date of each day in advance, just as if they had been torn from papers already published. This copyrights each issue when published. When this is done, a deposit of several hundred dollars is made, to be used as the days go by. These moneys are called trust funds. They are held by the Register of the Treasury.

The question as to the minimum amount of water required for stamp mills is one that suggests only a general answer, as conditions vary. In the excellent treatise on gold milling, recently published herein, E. B. Preston, on this subject, says:

The amount of water required for the proper working of the battery depends on the nature of the ore; clayey ores, or such as have a high percentage of sulphurets, requiring the most; but while in the former case a greater amount is needed inside the mortar, the latter condition permits a part being added outside the screen, on the lip of the mortar. A small sluice-box, with plug holes, is placed across the front in this case, or the water is conveyed by means of a half-inch perforated iron pipe, attached to the vertical supply pipe by an elbow joint, permitting it to be turned either way as required. The amount of water used per ton of ore stamped varies from 1000 to 2400 gallons with a mean amount of about 1800 gallons per ton of rock crushed. Most of the mills in actual practice figure roughly on one miner's inch of water, more or less, per twenty-four hours for each battery of five stamps. To obtain the largest amount of crushing of clean quartz from a battery, only sufficient water should be used inside to keep up the regular, even swash of the pulp, and if that be not sufficient to keep the plates on the outside clear from accumulating pulp, more may be added outside the screen. The pulp, in passing down over the apron plate, should roll in successive waves, corresponding to the back-and-forth wave motion inside the battery, rather than flow in an even sheet, as affording a better opportunity of contact for the particles of amalgam. Where the temperature falls low in winter, arrangements should be made to deliver the water in a tepid condition, as better amalgamating results will be obtained, through keeping the quicksilver in a lively condition. Where steam power is used, this can be easily arranged; but when using water power, a separate heater is required.

In "rawhiding" ore in British Columbia cowhides are used just as taken from the carcass; inch holes are cut one foot apart around the edges, the hide laid flat and the ore piled in sacks thereon; the ends and sides are drawn together by a rope passed through the holes, the neck in front and fastened to a singletree. A mule is the motive power, and fast time is made down the trail, a rough lock, consisting of a log chain, being used in steep places.

Platinum in the United States is almost entirely a California product; the principal platinum-producing section of California is in the northern part—about the Klamath river and its tributaries. It is also found on and near the great serpentine belt traversing Sierra and Plumas counties. In stream sands it occurs nearly always in small worn grains and scales; occasionally in globular particles of varying purity and color. It is usually associated with iridium and osmium.

SO FAR AS HEARD FROM, the bill which recently passed the United States Senate suspending the operation of the annual assessment law on unpatented mining claims as to men enlisting in the U. S. army has not passed the House, though it promptly should. In the war of '61–'65 such a provision was in force. Miners and prospectors are enlisting, and should be granted this extension. The law was made for times of peace and should be temporarily abrogated. It ought to be only necessary for any miner or prospector to file an affidavit of his enlistment that during his term of service no assessment work be required on his claim. The miners are prompt to enlist and make valuable soldiers.

A NEW STRIKE of exceeding richness is reported at the Keystone mine, Amador Co., Cal. Apart from the usual newspaper exaggeration regarding values and extent, it may be conservatively stated that the recent offer of the mine for $250,000 has been withdrawn, and that there is sufficient low grade ore to keep the mill in constant profitable operation for an indefinite period. As a rule, the biggest money in mining is made from "low grade" ore, where it exists in large quantities and can be mined and treated cheaply. Some of the most profitable mines in the United States are producing their dividends from ore containing less than $4 to the ton. The old Keystone is one of California's stand-bys. It has yielded over $12,000,000.

Sierra Buttes Gold Mining Co.

On April 21st, in London, a meeting of the above company was held; Chairman Tendron said: The Buttes mine, in the experience of the predecessors of the company, was, no doubt, one of the earliest pioneers of quartz mining in California. The early days of the company were very prosperous, and during its existence the shareholders have had dividends amounting to $1,704,765. But in 1890, when the deepest tunnel, about half a mile on the dip of the vein, had been completed, and rises made from that tunnel to the eighth tunnel—three rises of 175 feet were made, and yet pay ore could not be found. I do not suppose that we made a profit of $50,000 out of all that work between the No. 9 and the No. 8 tunnels. In 1890 we decided to cease all work in the lower part of the Buttes mine if the decision that had been come to by the Board—that we would not work at a loss—was to be carried out. But we decided that the mill on the higher ground should be renewed, and that we should work up the dumps and see if we could find some bodies of ore, which though poor and not considered good enough to be worked by the first proprietors, might yet be made to pay, having regard to the very economical regime that the mine was then placed under. Well, that policy was successful. We did not make large profits, but we at all events recouped the whole cost of the mill, and the cost of repairing the flumes, and we paid all our expenses and made a little money. Last year there were indications of a possible slide that would carry away the mill; and, therefore, the question arose whether we would put up another mill, and do the work necessary for bringing the ore from these old workings to the new mill. The cost was to be $10,000, and we thought we would run that risk.

The mill has been finished and the tramway made. Mr. Johns was at the Buttes mine the beginning of the month, and says that he has made a careful examination of the new mill and tramway, and also of the mine, and finds that the mill is well and strongly built and the tramway working satisfactorily. He also says that a raise has been put up from the No. 3 level to the No. 2, which has been opened 275 feet and connected with the No. 2 of the Independence mine, and there is a considerable quantity of quartz exposed, some of it looking well and some very poor. It cannot, however, be very well selected; it must be taken as it stands, as there is gold in the whole of it, and it must all, or nearly all, pass through the mill. He cannot say anything positive, nor can we. The working of the new mill for the first month met all expenses; strange to say, the expenditure and the cost came to within $1 of each other. In the telegram received from Mr. Johns, April 20th, he says he will do better this month as far as the mill is concerned.

Now we come to the Eureka, and there our experience is almost the same. For a few years after the company was formed, in 1872, the working was not satisfactory; but, after that, it became a prosperous mine and the shareholders have had dividends amounting to $2,583,965. Like the Buttes, however, the vein, although fairly strong, diminished in auriferous properties in depth; and had it not been for a flat vein that was cut in the Eureka tunnel, we should hardly have any profit at all out of driving that very long tunnel. The flat vein was just cut in the roof; a few feet lower down would have missed it. It proved very profitable. The extraordinary thing in connection with the Eureka is that, in addition to the vein proper, there are no less than four flat veins, almost like coal seams, on that property. Flat veins are not satisfactory working; they are more expensive, and generally narrower, and more subject to vicissitudes. They are narrower in places and much wider in other places than ordinary vertical veins, or veins that are nearly vertical. And these flat veins are exhaustive to work. They have been thoroughly explored, and I do not think it is of any use to carry the explorations any further. Mr. Johns would like to spend a little more money on the flat veins in the Eureka property, but I strongly object to it. He understands that anything I say to you to-day is to go to him as an order, and I object to any money being further expended at the Eureka mine. I wish the stores and materials realized, and the place closed, and whatever can be got for it to be got. The Eureka has a certain amount of funds, which I will refer to later on, and I am not at all disposed to see that amount diminished. The usual course in dealing with a mining property is to go on until you have spent every shilling and you are more or less in debt, then to reconstruct, and afterwards to raise money on preference shares or bonds, and somehow to go on until there is a second reconstruction, and, as long as it is possible, to get money out of the shareholders' pockets. We have no idea of working upon those lines. So long as they can work abroad so as to cover their expenditure and the expenses here, so long shall I recommend the shareholders to have patience. And you have every reason to have patience, because one of the directors is the holder of $1,000,000 in the two companies, and any division of assets would put a good many thousands of pounds into his pockets. It is only the Eureka that has money. You may be sure that if he approves the policy that is being carried out, it is the policy that is best in the interests of the shareholders. Now, of those dividends to which I have referred, amounting to $4,288,730, $315,615 came from the Uncle Sam. That mine was bought in 1889 at a cost of $160,000. There is a considerable amount of stores and materials there, but I do not think the figure correct. I do not think these stores will realize half the amount they stand at. Instead of being $8500, I shall be very well satisfied if we can get $5000 for them. These stores must be realized and that mine must be disposed of if Mr. Johns can find a buyer. So long, however, as the men are willing to work on tribute, we shall be willing to allow them do so; but there must be no more work at Uncle Sam on our account, and the moment the men cease working during the summer, whatever stores and materials cannot be sold must be sent to the Whitlock.

Now we come to the later mines, and I shall refer in the first place to the Mammoth. It was bought in 1894 at a lower figure, perhaps, than any mine has ever been purchased by the British public—namely, $25,000. But yet that wretched mine has cost us in development and surface work up to the present time over $100,000. Mr. Johns has written me a long letter in which he says: "The best mines in Tuolumne county are found in the hanging-wall country of the mother vein, and if the directors desire to have the Orcutt (which is a continuation of the Mammoth) prospected, I would suggest the sinking of a shaft 400 or 500 feet deep a little to the eastward of the mother vein, and crosscutting both eastward and westward of it, and thoroughly prospecting to that depth. From the developments already made in the Mammoth, I have little or no hope that better results will be obtained by continuing the work. If the directors should decide to prospect the Orcutt, they must expect to spend from $25,000 to $30,000 in doing so." I never knew anyone's estimate to come out at more than the actual expenditure. Therefore, to that we give an emphatic "No." There shall be no more money spent at the Mammoth. If Mr. Johns can find American gentlemen—and there are plenty of them with any amount of money in San Francisco—who are willing to do the prospecting, and, after paying the expenses of working, will be content to keep one-half of the net profits for themselves and give us the other half, we shall be very glad indeed; but, so far as we are concerned, no money goes from this side, and we will have no debt incurred. I hope that is perfectly plain-speaking, which will be intelligible to Mr. Johns, and that he will regard it as an instruction and act accordingly.

Now we come to the one mine that alone stops the company from being wound up, and that is the Whitlock. That, too, was bought in 1894. It was bought cheaply; but, like any other mine, cost a considerable sum for development and surface work, until it figures in the balance sheet at $203,970. Well, that mine bears all its development now, and has done so for some time, and it makes a profit. So long as it makes a profit sufficient to pay all the expenses out there, and the London expenses also, so long will we go on with the Whitlock. The telegram received as to the present state of things is quite as satisfactory as I expected, but this is not saying much. The ledge is now reached in the fifth level, and has been driven along for 105 feet. It averages 5 feet in width of $6 ore, and it continues ahead. There is no sign at present of its discontinuing. The flat vein that is also met with in the Whitlock, called the mill vein, is continuing, and is worth about $7. For the moment it is very narrow, only 1 foot wide; a short time ago it was 2 feet wide, and before that 3 feet wide. It will probably widen again; at any rate, we hope so. The branch vein that had broken and pinched a short time ago, going towards the surface, is making again; it is 3 feet wide, and worth $7 per ton. You will have noticed that during January, February and March we were making a fair profit—or, at least, sufficient for our requirements. I can hardly call it a "fair profit," for we are greatly disappointed there in the quality of the ore. If the ore had been what it was reported to be during the time when we bonded and worked on the mine—$8 to $12—we would have been making very good profits now.

Now what is the present position of the Eureka?—for, after all, the Eureka is the only monied partner at the moment. The Eureka has investments that would realize, even in the present depressed state of things, a profit of nearly $10,000—in other words, investments which would realize about $70,000. We have cash in London and in California amounting to $28,000, after paying off all our creditors; and the stores and materials, that stand in the balance sheet at a little over $30,000, can very well be put down at $22,000. So the Eureka shareholders, if the company were wound up, would have about $120,000 to divide, less the liquidation expenses, which would not be very heavy. We hope that, if we continue our operations, the cash assets will be a little more than $200,000, because the Eureka has advanced the Buttes between $15,000 and $20,000 in connection with the purchase of these new properties. The Eureka has paid more than its moiety, and the Buttes could not pay its moiety if it were pressed to do so by about $25,000 or $26,000; so that any profit made by the Buttes, and any moiety of profit made at the Whitlock, will go to the Eureka until the Buttes account is squared up. This is not a lively state of things. I think one of the mining papers said three or four years ago that I was a sort of prophet, always preaching in the wilderness and crying out for the death of these companies. Certainly you must admit that the Old Eureka and Butte mines have been a long time dying, and they are not dead yet. You have only the choice of two policies—either to wind up at once, or go on a little longer in your own interests, as well as in the interest of others. Between now and next winter we shall know a little more clearly how we stand—whether Mr. Johns has been able to do anything with the other mines, whether the Buttes is earning a little, and what prospects there are at the Whitlock.

The report and accounts were adopted.

Mine Development in Nevada.

J. D. PINDER, M. E.

Those who have made intelligent observation of the possible mineral production of Nevada cannot doubt that great wealth and prosperity will some day attend the efforts of legitimate enterprise in the proper development of the numerous and promising deposits known to exist within the State.

That Nevada is dilatory in this particular cannot be denied. Almost everyone has claims, more or less, but few possess the means with which to develop them. And there seems to be little real interest manifested in procuring the necessary assistance of those who have such means. But there is one feature connected with the mining industry which is apparently but little understood, and that is the matter of mine development, or the lack of mine development.

There are almost as many prospects as there are claims; and there is one very prominent idea in the minds of prospecting miners, and that is, if they have a 50-foot shaft or a 100-foot tunnel on a lode, they have a mine. But where one good prospect has these there are a hundred of less development. If the people of the mining districts doubt this assertion let them cast their eyes over the mining fields of their own section and figure on the developed and undeveloped lodes, and they may realize what they have within their grasp in the way of golden wealth with no one grasping for it. And why? I will answer: Because the amount of develment does not justify the thousands of dollars generally asked for the property. In these latter days of greater experience there must be something to show for the demand, and it must be so developed that it may be estimated by measurement, as to width, depth, length, quantity and value per assays, less the probable cost of mining and reduction; and on this showing it is very safe to determine whether the demand is in excess of the estimated value. There are may other points to be taken into consideration when purchasers estimate values, where a question of hard cash is concerned, that have been taught by long experience. And here let me say: The period when holes in the ground have a value is passed; there must be developed merit for coin.

The markets are flooded with so-called "mines," and when an offer is critically investigated even in the city before the property itself is examined it too often falls short. And if the "prospect" does present acceptable features and enough to induce the expenditure of time and money to examine the property, in nine cases out of ten, there is something to be discounted:

At the present time there is an active demand for good developed properties, and I will say right here that it is less trouble to sell a fairly developed property than it is to find one. I know of five requests in one day, recently, from English and American capital, all wanting well developed, active producing properties, not so much the of production bullion as of ores, as a guarantee for a milling or smelting proposition—with sufficient development upon which some safe computation as to value could be made to justify the price asked. It is a fact that it is almost impossible to meet such demands.

A prospect having a shaft 50 feet deep and a drift 50 feet on the lode having a "nominal" value of say $10,000 would hardly be looked at by capital; while the same property having a shaft 300 feet deep and 300 feet drift on the lode, would readily command a price of at least $300,000, with say $6,000 to $8,000 for development of five or six months' work. This is an example of the profits of development.

A CERTAIN Kalgoorlie mine manager had a mine under his control which held out good prospects if opened at a depth. He asked his London board for a winding engine, and immediately a 10-stamp battery was forwarded to him. As there was no payable lode proved on the mine the stamps were useless, and for a year or so lay in Coolgardie in the original packages. Now, however, those same stamps are likely soon to be doing good, as they have been purchased by another company, and form a portion of the largest battery on the Kalgoorlie field.—Kalgoorlie, Australia, Standard.

Speed Government in Water-Power Plants.*

NUMBER I.

MARK A. REPLOGLE.

No problem in hydrodynamics has created so much interest in the past few years as the government of water powers. When it has been demonstrated that power could be successfully transmitted to great distances by the use of electric currents, the economist very naturally conceived the idea of harnessing available waterfalls. It was well known that turbine water wheels could be constructed that would furnish to a dynamo an efficiency of 75 per cent, or more, of the energy represented by the fall or head. The conservative engineer and the investor, however, were much concerned about the possibilities of regulation or government, and much diversity of opinion has been expressed by thoughtful and earnest engineers regarding it. Specialists have spent much labor in experimenting and developing apparatus to govern power plants. It has been demonstrated that water-power plants can be successfully governed. But the various degrees of regulation, ranging from indifferent speeds up to good engine practice, even with the same apparatus when used in different water-powers, prove that there are some underlying principles that must be adhered to if successful regulation is to be obtained by calculation or intelligent reasoning, and it is for the purpose of discussing some of these principles that this paper has been prepared.

Very little literature can be found that treats on the government of water powers in a scientific manner, and what is extant shows that the German, Swiss and French engineers had spent much thought and labor on this subject years before the problem became an important one in America. Space forbids any comments on their experiments or practice, except to say that, until within a very few years, they were far in advance of our own hydraulic engineers in this particular part of power-plant construction.

Regarding the early work in this line, nothing better can be said than to quote the "Encyclopædia Britannica," which says: "The science of hydrodynamics was cultivated with less success among the ancients than any other branch of mechanical philosophy. If we except a few propositions on the pressure and equilibrium of liquids, hydrodynamics must be regarded as a modern science which owes its existence and improvement to those great men who adorned the seventeenth and eighteenth centuries." During the early part of the nineteenth century rapid advances were made by Europeans in methods of getting power from gravity by the use of the agent water. The interest awakened by the success attained, as well as the necessity of good government in localities where steam power was expensive, no doubt had much to do toward an early development of governing apparatus in the European counties. In America, steam power has been so cheap as almost to supersede water power in some localities, and where steady power was a necessity it was almost invariably furnished by steam engines, water power being used only where little or no government was required. Hence the American manufacturer was fairly satisfied with a device that would slowly move his wheel gates when too great a change was perceptible in the speed of his plant. Such device was called a governor until the electrical engineer of recent years discovered that his machinery was safer if he ignored entirely the so-called water-wheel governor.

The late successes in long distance transmission make water powers more valuable than they have been considered in the past, and the demands for reliable speed regulation are so urgent that there is a decided tendency on the part of engineers and investors to study the proposition more from a scientific point of view, laying bare, if possible, the principles that underlie it. These principles then may be used for foundations from which to reason out a solution of the problem. The doubts concerning the satisfactory government of water power have often caused capital to be withheld where it otherwise might be earning handsome dividends. It is very apparent that speed government in water powers should be reduced to an exact science, if possible, and it is hoped that this paper will exert some bearing to that end.

The following preliminary view of the proposition will disclose some of the difficulties that do not appear at first thought: First to be considered is the water. It is an inert material, incompressible, and having inertia, hence momentum when in motion. It contains no power whatever except that generated by gravity in giving it motion. Perhaps no better demonstration of the evil effects of inertia and momentum in governing can be given than the experience at the power plant of the Fresno transmission. (Plate 1.)

A feeder pipe about 3800 feet long is used to carry the water from *A*, the outlet of a reservoir on a mountain top, to *D*, the power house on the San Joaquin river. The fall or head in this case is 1410 feet, and the pipe is amply heavy for all the ordinary strains that come in the manipulation of the power. Before the plant was ready for actual operation, through some accident, a valve at *D* was opened, allowing a 4-inch stream of water to escape; the pressure gauge, which ordinarily showed 610 pounds to the square inch, dropped to 350. The valve at *D* was almost immediately closed by the attendant when the pressure-gauge pointer ran up to its limit, 1000 pounds to the square inch. Immediately following this was a great writhing in the pipe line, ending in a report at *C* about 700 feet vertically above the power house. The pressure gauge dropped to about 300, and the flood of water coming down the mountain side indicated that the pipe had burst at *C*. Further investigation showed that the pipe from *A* to *B* had collapsed or flattened. The logical conclusion is, that when the valve was opened at *D* the portion of the water column from *B* to *D* began moving. That portion of the column from *A* to *B* lying in an almost horizontal plane did not have its inertia overcome quickly enough to follow, hence the column separated at *B*, causing a vacuum from *B* to *C*. When the valve at *D* was closed the water from *D* to *C* came to a standstill, raising the pressure by its momentum to 1,000 pounds per square inch, showing proof that the engineers had calculated correctly. By the time that the valve was closed at *D* the column *A B* had been acted upon by gravity for some seconds, thereby giving it time to acquire considerable velocity, hence momentum; therefore, when it reached the other column at *C* the concussion burst the pipe, showing at one bold stroke the effect of incompressibility and momentum. The collapse in the pipe from *A* to *B* was due of course to the water emptying faster at *C* than it could at *A* (the pipe line here being of much lighter steel).

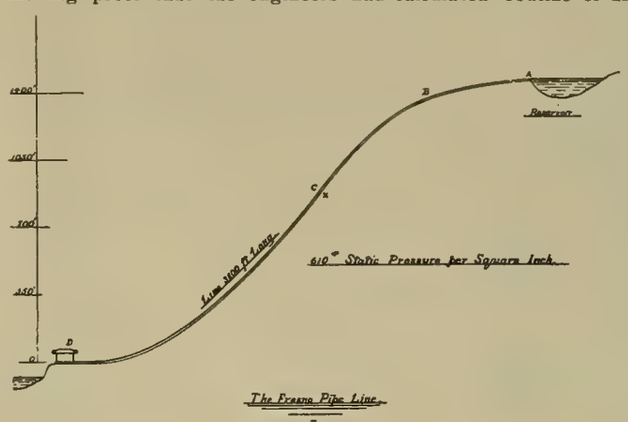


PLATE 1.

It can readily be seen that if government in this plant were attempted by changing the flow in the pipe line, as is ordinarily done, it would have been an impossibility if the safety of the installation was a consideration. Hence the governing is done by shifting a stream of water on or off the wheel as the power demands require.

It might be added incidentally that the stream from a nozzle 1⅝ inches in diameter furnishes about 500 H. P., also that said stream can very quickly bore a hole through a granite rock or even a steel plate. It requires much care and ingenuity to handle this power plant, but it has been in actual operation for nearly two years, and is an unqualified success.

The inference to be drawn from the above experience is, that these evil effects appear in every power plant in a corresponding ratio to the length of pipes or closed flumes used to carry water to the wheels. The injurious effect on government is to change momentarily the pressure or head on the wheel when any movement of the wheel gate is made. The effect is always the opposite from that required to keep even speed. Hence there is a limit to the time allowable in the gate movement.

(To be Continued.)

*Journal of the Franklin Institute.

The Use of Lime for Cleaning Slimes.

In the treatment of slimes on the Rand field it was discovered, early in the course of experiments, that the clarifying properties of lime were not due intrinsically to its alkalinity—though that is in itself of distinct value in another direction, for caustic soda amongst other alkalies has but little effect, whilst some acids and salts produce marked results. It was W. Bettel who first associated this property with the phenomenon known as surface tension. The study which the importance of this property has tempted chemists into has led to the unearthing of a report by two German chemists, Messrs. R. Sachse and A. Becker. This report relates to the use of lime in agriculture, and is preserved in the Landw. Vers. Stat. 43, 1893, Nos. 1 and 2, fol. 15–25. The investigation dealt with the use of lime and various other reagents for the flocculation, or curdling, and for the precipitation from water, of the suspended, finely divided quartz and clay, together with the acceleration induced by lime of filtration, through soils. The authors conclude that the action of lime in this connection is not chemical, but due probably to the obscure physical laws governing such phenomena as those of surface tension. Lime, carbon-dioxide, hydrochloric acid and monocalcium phosphate were found to be the most efficient; sulphuric acid, nitric acid, potassic chloride, ammonic chloride and sodic chloride produced a similar though less marked effect; calcic, magnesic and ammonic sulphates were not very effective; potassic dihydric phosphate (KH_2PO_4) gave negative results, whilst sodic nitrate actually reversed the curdling action. Many other soluble noncollodial bodies were proved to accelerate settlement and filtration, as, for instance, potassium cyanide, as well as the soluble iron and alumina sulphates contained in a mill pulp water itself.—S. A. Mining Journal.

Opinions.

By H. H. KELLEY, in *Scientific Machinist*.

Have you ever enjoyed an evening in company with practical engineers during a discussion of the various items of interest which occasionally drop into the routine of an engineer's life? These items are of value and serve to break the monotony of what would otherwise be an uneventful existence. Those who are members of some engineers' association undoubtedly have, and such experiences carry much of interest and helpful information to the engineer, although the result of opinions expressed under these circumstances is not likely to prove such as would warrant much thought, nor a careful consideration of the details in each case being given. After enjoying such an exchange of ideas and opinions—perhaps many times—and when accuracy is at rather a low ebb, we are very apt to use the same freedom when giving our opinions in cases where the outcome may mean a saving or loss expressed in dollars and cents. Nor is this to be wondered at, for no doubt in many instances we will have had our opinions apparently substantiated in finding several others who held similar views upon the same subject, and, therefore, almost unconsciously conclude that our ideas are about right. Several years ago, when in company with perhaps a dozen engineers, the subject of heating surface in a boiler was brought up, and this led to an interesting discussion of a subject which seems to be ever open to differences of opinion.

During the conversation one engineer stated that he never allowed less than 15 square feet of water heating surface per H. P. of an engine, and would never recommend a boiler, for any engine, that did not contain this amount.

Another engineer said that was useless, as there was no need of so liberal an allowance being made. In his experience he had found 12 square feet to be ample, and a boiler containing this allowance per H. P. would, in his opinion, run any engine. Another stated that during about fifteen years' experience with boilers he had found them to work very satisfactorily with an allowance of only 10 square feet per H. P. Few agreed with this gentleman, and still fewer with the next gentleman, who said he was running a plant in which the allowance was only 8 square feet per H. P. of engine, and with good coal he had no difficulty in keeping up steam. Matters began to grow warm about this time, but no one seemed inclined to dispute the other, as all were about equally well versed in the matter, having formed their opinions from actual experience in the boiler room. However, it does seem almost improbable, at first thought, that these opinions, differing so widely as they do, could be founded upon actual experience. Let us look at this matter from the engine side of the story, and perhaps the cause of these seeming improbabilities may be discovered. Let us take, for illustration, four engines representing four different kinds, or makes, and each engine is developing 100 H. P. We will assume that, owing to the difference in design of engines, valves and valve-gears, the weight of steam, or water required, from and at 212°, per H. P. per hour is as follows: First engine, 20 pounds; second engine, 25 pounds; third engine, 30 pounds; and the fourth engine, 37.5 pounds. Now, in this case the boiler is proportioned so as to evaporate 2.5 pounds of water, from and at 212°, per square foot of heating surface per hour.

The heating surface in each case, or rather the allowance required per H. P. of engine, may be obtained by dividing the weight of water required by the engine per H. P. per hour by the weight of water evaporated per square foot of heating surface per hour by the boiler. While the H. P. developed by the engines, and also the weight of water evaporated per square foot of heating surface, are the same in each case, yet we find that the allowance of heating surface per H. P. of engine varies considerably, as follows: First engine, 8 square feet; second engine, 10 square feet; third engine, 12 square feet; and the fourth engine, 15 square feet. From this we

see that the gentlemen referred to above, while making some very curious remarks, were, or might have been, correct in each case.

The chances are that no two men were running the same kind of engine. A few minutes later the "12 square foot" gentleman related his experience with a mill owner who had a horizontal tubular boiler containing 900 square feet of heating surface and 22.5 square feet of grate surface. This boiler was supplying steam to a side-valve engine developing, on the average, 75 H. P., but occasionally the load was increased to such an extent that the engine, which was already working beyond its rated power, was found to be too small. The boiler being in good condition the mill owner thought he would try and run an engine of 100 H. P. with the same boiler. It came to pass that he met our "12 square foot" gentleman and asked his opinion with reference to the proposed change. The latter, after a little figuring, replied that he thought it a very poor thing to do, for 900 square feet of heating surface divided by 12 (his invariable rule) equals only 75 H. P.; therefore the mill owner would be trying to run a 100 H. P. engine with a 75 H. P. boiler, which would be very uneconomical indeed.

The mill owner was not entirely satisfied with this bit of information and so referred the matter to Mr. Blank, another engineer in the same town, who in a day or two reported that, if the mill owner would purchase a certain make of engine he thought the mill could be run with the same weight of coal as in the case of the smaller engine. It may be of interest to see how Mr. Blank arrived at a conclusion so different from the "12 square foot" gentleman. As stated above, the boiler contained 900 square feet of heating surface and 22.5 square feet of grate surface, which gives a surface ratio of 40.

According to a formula from a well-known author, the evaporating capacity of this boiler expressed in pounds of water from and at 212° per hour, and when consuming sixteen pounds of coal per square foot of grate per hour, is 4240.8 per hour.

The H. P. of the new engine, as stated above, was to be 100; therefore, if the engine was to require steam as fast as the boiler could generate it with above weight of coal per square foot of grate per hour, the water consumption per H. P. per hour would be 42.408 pounds from and at 212° Fahr.

Now, it would not be a very difficult matter to find an engine of 100 H. P. having the above water rate; therefore, if the mill owner had acted upon the opinion of our "12 foot square gentleman," he would either have continued to run his mill at a loss or would have purchased a new boiler in addition to the larger engine, which would have been another large item of expense, and, in this case, entirely unnecessary.

Although the above may have been what is commonly called a "thank you" job, the fact remains that any engineer who takes pains to have his opinions correct, and therefore reliable, is at least gaining the confidence of those who seek his judgment, not only in matters mechanical, but other things as well, and the confidence thus gained will sooner or later pay the engineer handsomely for his labor when his opinion may again be asked.

It is not an infrequent occurrence nowadays, when a new boiler is needed, to have the firm refer the matter to the engineer for his opinion with reference to the capacity, design, pressure to be carried, etc. It is certainly a pleasure to note that such actions on the part of firms and proprietors of establishments are increasing in number every year. No doubt these men are beginning to appreciate the fact that engineers have risen rapidly in their profession from the position occupied but a few years ago. Engineers read more, study more, think more accurately, and, therefore, are more intelligent and skillful; and when an engineer expresses his opinion nowadays it has greater influence upon the person seeking it than formerly. When bids for the new boiler have been received, they are very often referred to the engineer before an acceptance is granted and a contract for the delivery of the boiler entered into.

This is particularly the case when it is not quite clear to those in the office which of the bids could be profitably accepted. This offers the engineer an opportunity of making his opinion of value to those employing him, and establishing his reputation in their minds as a man who understands his business. To illustrate a point in a simple manner, where those who are not familiar with steam machinery would be very likely to go astray in a case as cited above, we will suppose that two bids have been received for a boiler which is to contain 1040 square feet of heating surface.

The first bid offers a boiler 64″ x 16 feet, with fifty-four 4″ tubes and contains 1040.88 square feet. Price, $900. The second bid offers a boiler 64″ x 16 feet, with seventy-four 3″ tubes, and containing 1037.64 square feet. Price, $915. The engineer looks at the figures representing heating surface and then at the price.

He finds a difference of only 3.24 square feet of surface, and a difference of $15 in the price, and, were he not a careful man, in such cases he would conclude at once that the first bid was by all means the lower, and would therefore recommend its acceptance. Boiler makers do not always compute the heating surfaces in boilers by the same method, or upon the same basis of measurements; therefore, our thoughtful engineer knows that there is an opportunity here for the consideration of the big, little "if," namely, if the heating surfaces in these boilers were computed from similar measurements, then the first bid would be the lower; but, if not, then the second bid might prove preferable. To satisfy himself upon this point, the engineer first computes the heating surface in the boiler first named, using outside dimensions, and he finds the number of feet to be the same as that stated in the bid. Then he computes the surface in the second boiler, using outside dimensions also, and finds the heating surface to be 1102.76 square feet, and, dividing the number of feet of surface in each boiler by 12, he obtains 86.74 H. P. for the first boiler and 91.89 for the second—the cost per H. P. being, respectively, $10.37 and $9.95. Our engineer also finds that in accepting the second bid he would obtain the additional 5.15 H. P. at $2.91 per H. P. Therefore, he recommends the acceptance of what at first seemed to be the highest bid. No moralizing upon what has been said is necessary for the engineer, but the foregoing incidents assure us in a mild way that, in view of the advanced position we now hold in our profession, it becomes necessary that we refrain from expressing our opinions upon the spur of the moment, but must take into consideration all the circumstances and conditions obtainable in each case before passing judgment, thereby not only doing justice to ourselves, but preserving our reputation, not as mere runners, but as engineers who understand their business.

Witwatersrand, South Africa, Gold Yield, '97.

Tailings—Tons crushed	3,740,799
Value	£2,775,108
Shillings per ton	14.84
Concentrates	£457,780
Dry crushing	£40,517
Other methods	£300,578

The figures for the cyanide zinc process are:

Tons treated	3,020,311
Assay value per ton (shillings)	20.75
Gold won	£2,267,155
Gold won per ton (shillings)	15.01
Concentrates treated (tons)	33,631
Assay value per ton (shillings)	130.25
Gold won	£171,443
Gold won per ton (shillings)	101.96

To these figures should be added the dry-crushing figures given above. Next comes the Siemens & Halske process:

Tons treated	720,488
Assay value (shillings)	21.30
Gold won	£507,303
Gold won per ton (shillings)	14.10

The only district in this Republic, except the Rand, where the Siemens-Halske process is used is the Pilgrim's Rest district, where in 1897 gold worth £8944 was won from 6170 tons, no return being made for 1896. Next comes the treatment of concentrates by the chlorination process:

Tons treated	15,599
Assay value (shillings)	391.63
Gold won	£286,337
Gold won per ton (shillings)	367.12

The gold won by other chemical processes amounted in 1897 to £300,578, as against £34,180 in 1896.

All these figures point to a very great advance both in chemical and metallurgical science and in the extension and enlargement of chemical plant and reduction appliances.—South African Mining Journal.

UNITED STATES SURVEYOR GENERAL GLEAVES, who took office last month, has found that to complete the surveys of many townships in the State only a little work on each is necessary, two or three sections in many instances being all that have not been surveyed. He has a plan by which this work may be done expeditiously and with comparatively small cost to the Government. It is to district the State, appoint a deputy for each district and pay him a salary for finishing up the incomplete township maps. The present system is to get bids for each piece of work, no matter how small. Bidders in figuring include their expenses for going to each place. Bids are not always accepted, so that new proposals are asked, and frequently a long time elapses before the survey is ordered. It is believed that under Surveyor General Gleaves' plan the expense will not be half so great as under the old method, and the work will be done without delay.—Grass Valley, Cal., Union.

AN exchange gives the following wholesome advice to mining claim owners: If you have a piece of mining property and your neighbor alongside has another; if you cannot develop or sell your own, do not be afraid to help your neighbor dispose of his. Every mine opened in the country increases the value of every other mine or "prospect." If you can't sell yours to-day, a good mine opened alongside of it will help to dispose of it at some future time. It won't help the value to cry down that of your neighbor.

FROM W. J. Clark, Mullan, Idaho, the California State Mining Bureau is in receipt of plattnerite, or dioxide of lead, a scarce mineral of little commercial value, but to cabinet compilers of an estimated value of $90 per pound.

Reboring a Steam Cylinder.

A very effective method of reboring a damaged cylinder is described by Charles A. Hague in the *American Machine Shop*. A broken piston ring caused the damage, the cylinder being found to be rutted and scored from end to end, and pretty much all round, nearly an eighth of an inch in places. The work was done during a shut-down for a holiday. The engine was of the inverted, vertical type, the cylinder 36 inches in diameter and 60 inches stroke; the piston was of the box form, fitted with a bull ring, in two sections, with two packing rings. All that was necessary in preparing the piston was to measure the cylinder as it was before the cutting, then allowing for the amount to be bored out in renewing the scores, make a new bull ring, in whose inner circumference would fit the piston body, and whose outer diameter would correspond to the rebored cylinder, and to this new bull ring have fitted new packing rings.

This work upon the piston rings could all be done in advance, the head having been taken off the cylinder one night and the necessary measurements made, the exact size of the new packing rings giving a gauge to which the cylinder was to be finally bored. Every other possible preparation that could be thought of and made in advance was looked carefully after, leaving nothing but the actual work of setting the tools and boring the cylinder. A suitable bar was found which was used for repair work. It was of good size and had a traveling head moved along by means of a feed screw, which in turn was actuated by the well-known "star feed," the screw being let into a groove in the side of the bar, and engaging with a nut attached to the boring head in the usual manner, the boring tools being, of course, secured in the rim of the head.

At one end of the boring bar, the upper end in this case, there was fitted a large spur gear, but so arranged that it could be readily moved along the bar as different work might demand. This gear was driven by a small pinion, also adjustable for different needs, and attached to a small shaft parallel with the boring bar. The whole driving mechanism and the end of the bar were strongly supported by a cross-shaped framing of cast-iron, which could be secured to a cylinder by using the regular cylinder head studs. This left everything clear within the cylinder, so that the counterbore could be cleaned up by proper adjustment of the cutting tool when the boring head was at the upper end of the cylinder. It was found that it would be desirable to employ bevel gears, so as to obtain a horizontal pulley shaft, and therefore a couple of brackets were fitted to the boring-bar frame to carry the second shaft. All of this and other work needed to prepare the bar for immediate use upon this particular cylinder was done in advance, and everything was ready for prompt action.

The lower end of the boring bar was supported upon a steel center like a lathe center, fitted tightly into a cast iron block, the block taking the place of the stuffing box gland. The lower cylinder head, the entablature, and the framing being undisturbed, of course the alignment of the bore of the cylinder after finishing was assured, the upper end of the bar being carefully set by means of calipers, with the old counterbore at the top. The counterbore at the bottom of the cylinder was first made by setting out the cutting tool at the lower port, care being taken to have it just a little larger than the proposed new diameter of the working part of the cylinder; then the upper counterbore was made also of the proper diameter and depth, and there was then nothing to do but to carry a plain clear cutting from one counterbore to the other. This was done in two cuts. The roughing cut was made with three cutters and went through with great rapidity; the finishing cut was made with one broad-nosed tool, also with rapid feed, but taking out very little stock. The first cut went through in 132 minutes, and the second in 164 minutes; the first with the cutting edges at the rate of 19 feet per minute each, and a moderate feed, the second at 12 feet per minute, with about a three-eighths feed per revolution. The stock in the cylinder casting being of good quality, the newly made bore was a beauty. It took three hours in the morning to get ready for operations, one hour to finish the counterbores, five hours to bore the cylinder proper, and two hours to put the engine in order for running, the piston packing having been fitted while the boring was going on.

The boring bar was driven during this work by a small steam engine hired for the purpose. Upon the shaft of the spur pinion, already referred to, was a bevel gear which in turn meshed with a pinion keyed to a second shaft, and upon the end of this second shaft was a belt pulley. Power was transmitted from the engine to this pulley. A small steam engine, about 6x12 inches, furnished with steam from the regular boilers, and bolted to the engine room floor, provided a steady and reliable source of power, and the work went smoothly along, without interruption or mishap, to a complete satisfactory conclusion. The boring bar was removed, the cylinder cleaned out, the piston put into place, the head put on, and in just about eleven hours from the start steam was turned on, and the new bored

cylinder was doing work. It had been necessary to make some small bearings for the driving mechanism of the bar, but altogether the incidental expenses were very light, and in proportion to the benefits realized not to be considered.

Exploding Submarine Mines.

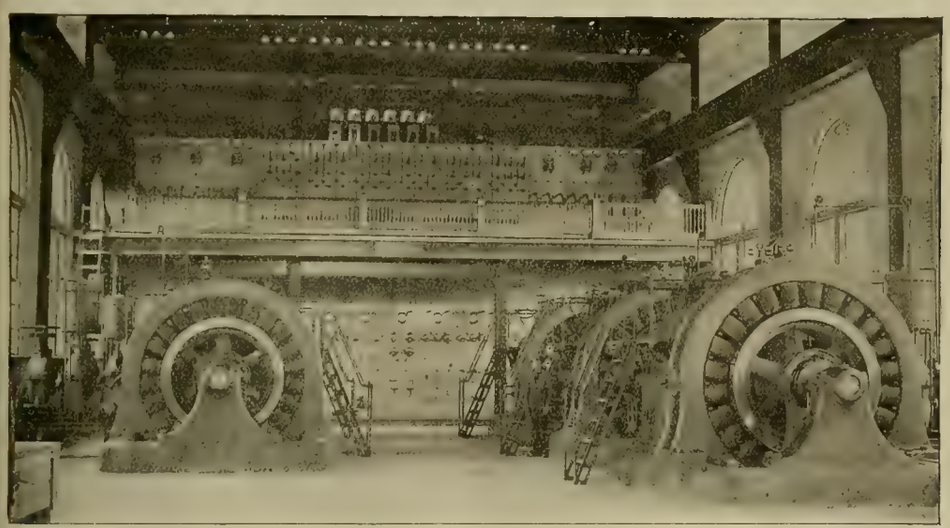
At the New York electrical exhibition there are displayed Edison's magnetic separator for iron ore, Moore's vacuum tube light, and Marconi's wireless system of telegraphy. The greatest novelty is a new method of blowing up submarine mines. The common way is to put an electric fuse inside the mine, and then connect it with wires which run to some convenient station on land. Here a battery is brought into requisition at the proper time. An electric switch having been closed, the current flows through the wires (miles in length, perhaps), and ignites the mine. The plan which is illustrated at the exhibition is to place, either inside or outside the mine, in connection with the fuse, a coherer such as Marconi uses in his receiving apparatus. A small battery is also placed beside the mine. No wires are run to the shore. Then at any suitable point, on ship or land, apparatus like Marconi's transmitter is brought into play. Merely closing the key or switch, at the transmitter, explodes the mine.

The coherer in the mine is so connected with the wires of the small close battery beside it that the current would flow through it and all other apparatus on the circuit (the fuse, for instance) only when a tiny gap in the coherer is bridged. This gap is scarcely a tenth of an inch wide, and between the bits of silver thus separated are some metal filings. The instant that the coherer is hit by certain electro-magnetic waves, sent flying from the transmitter, and traveling through the air and water for miles without any wire, the filings fly up and close the gap. Then the current flows through the fuse and the mine blows up.

There are several questions to be considered before this plan can be pronounced better than the other. It has advantages and disadvantages, and Uncle Sam has not yet adopted it.

Pioneer Power Plant, Ogden, Utah.

In the issue of April 30th appeared a technical description of a successful long-distance transmission



GENERATING STATION PIONEER POWER PLANT, OGDEN, UTAH.

experiment at the generating station of the Pioneer Electric Co. at Ogden, Utah. Herewith is presented a view of the station from which the experiment referred to was made.

A DUTCH JOURNAL gives a forecast of how long tin mining will last in the islands of Banka and Billiton. During the last sixteen years Banka yielded a yearly average of about 2,500 tons of this metal. Borings show that this output may last over thirty years, without any marked falling off. Billiton's tin resources, with a yield of about 2,000 tons yearly, will only last four years.

MINING ENGINEER H. C. SOUTHWORTH says: "A block of ground 850 feet deep, 500 feet long and an average width of the lode 10 feet, would give approximately 350,000 tons of rock, which, if yielding 1¼% copper, would give 4400 tons of copper, or about 8,800,000 pounds. At 12 cents a pound, this would be worth about $1,000,000.

A PAPER from the *Comptes Rendus* is noted in which D. Berthelot describes a new determination of the fusing points of silver and gold. A platinum-iridium thermo-electric cell was used for the purpose, and the melting point of silver found to be 962° as an average of six experiments, while that of gold is 1064°.

Manganese, Cobalt and Nickel Mining in Chili.

Manganese, nickel, cobalt, zinc and borax mining in Chili is the subject of an interesting German consular report translated for the *American Manufacturer*. The manganese deposits in the department of Freirina, the southern coast territory of the province of Atacama, are very rich in high grade ore. Fine ore is also found in the province of Coquimbo. An analysis of three kinds of ore from the latter province showed 40.79, 52.66 and 40 per cent of metallic manganese. The principal ore beds are located at Astilla, which is connected by railroad with the port of Carrizal Bajo; at Palo Blanco, Talquilla, Yerbas Buenas, and Charnarcito, all of which places are without rail connection with their nearest port, that of Totoralillo. Canas and Corral Quemado are at the head of a railroad leading from the coast to the mine. Cerro de la Gloria and Esquivel, like the former, located in the department of Elgui, have no shipping facilities whatever.

In the rich copper mines of Catemu, province of Aconcagua, manganese ore is mined from several veins. In connection with the mines, the company operates a small smelter, "Marquinas," which is located three miles from Chagres station, on the State railway, Las Vegas–San Felipe.

The Chilian manganese industry has made no progress during the fourteen years of its existence. In 1896 there were exported 26,151 tons.

The price of manganese ore is quoted since 1896 at £1 11s 8d, or about $8.

The industry is on the decline at present and there is little prospect of improvement in the immediate future. This is explained by the competition of other manganese producing regions, such as the Caucasus, southern Spain, India and Japan, which are located more conveniently to the principal consumers—Great Britain and the United States; other causes are the decline of the manganese prices during the last few years, the lack of transportation facilities between the Chilian mines and the principal shipping points, as Valparaiso, Carrizal Bajo and Coquimbo, crude and antiquated mining machinery and high ocean freight rates.

Manganese is used in the chemical industry as disinfectant and for bleaching paper, but by far the largest part of the world's manganese production is consumed in the manufacture of steel and finer alloys, such as manganese bronze. But with the exception of an infant paper industry at Llai-Llai and Buin, there are no such industries in Chili, hence the home consumption of manganese is small.

The Chilian cobalt mining industry is old, but it was never important. The highest export figure reached since 1844 was in 1874, when 685 tons were exported. In most of the silver mines cobalt is found at Mina Blanca de San Juan, department of Freirina, at Manillas, and Tambillas Buitre, in province of Coquimbo, and Cajon del Yeso, province of Santiago.

Nickel, like cobalt, occurs in all the silver ores. Especially high in nickel is the ore from the Colorado de Chanarcillo mine. Rich nickel veins are also found at Portezuela de Carrizo, near Huasca, and at San Pedro, near the small port of Flamenco, south of Chanaral. The export of nickel is insignificant and home consumption small, as there are no industries in Chili which could utilize it to any large extent. A small part of the nickel output enters into the fractional currency of the country.

Zinc occurs in some of the Chilian silver ores, especially those of Chanarcillo. The gold ores of Andacollo also contain some zinc blende, but the export of zinc is small.

Borate of lime is found all over northern Chili, and it is produced and exported in large quantities. The export in 1806 amounted to 8485 tons, that of calcined borax in 1895 to 107 tons.

As a rule, the mining of the less precious metals in Chili is declining with every year, owing to the poor shipping facilities, and the decline in the price of the metals, which can be produced cheaper in competing countries.

OUR Consul at Barmen writes that Joseph Kohlendorfer of Landshut, Bavaria, has invented a new process for making petroleum briquettes, by which petroleum refuse is worked up in such a manner as to assume the form of a solid substance, easily handled, and constituting a cheap and convenient fuel. In this process about 10 per cent of soda lye, with 10 per cent of any other kind of fatty matter—tallow, for instance—is heated in a boiler, either by superheated steam or the exclusion of air, and enough petroleum refuse is added to the heated mass to make up 100 parts. This mixture is then heated, under constant stirring for about one hour, the time varying with the mode and intensity of heating. Attention should be paid to prevent the temperature reaching the boiling point of petroleum, as in this case a large quantity of froth would form. In this incipient state of saponification, the mass acquires the property of taking up large quantities of fluid rock oil, and if this incorporation proceeds too slowly or remains incomplete, it may be hastened by adding a little soda lye. The mixture is run into molds and allowed to cool, when it may be cut into pieces of any desired form. Coal dust, saw dust or other refuse may be added during the process of manufacture, according to the use for which the briquettes are destined; and, if it should be desired to obtain a product of less consistency, the grease may be entirely or partially replaced by resin or resin acid, the product in either case having more than 80 per cent of petroleum, more than 90 per cent of combustible substances, and less than 5 per cent of incombustible residue.

A SIMPLE AND EFFECTIVE WAY of clearing rusted iron articles, no matter how badly they are rusted, according to Carl Hering in the *Electrical World*, consists in attaching a piece of ordinary zinc to the articles and then letting them lie in water to which a little sulphuric acid is added. They should be left immersed for several days, or a week, until the rust has entirely disappeared, the time depending on how deeply they are rusted. If there is much rust, a little sulphuric acid should be added occasionally. The essential part of the process is that the zinc must be in good electrical contact with the iron; a good way is to twist an iron wire tightly around the object and connect this with the zinc, for which a remnant of a battery zinc is suitable, as it has a binding-post. Besides the simplicity of this process, it has the great advantage that the iron itself is not attacked in the least as long as the zinc is in good electrical contact with it. When there is only a little rust, a galvanized iron wire wrapped around the object will take the place of the zinc, provided the acid is not too strong. The articles will come out in a dark gray or black color and should then be washed thoroughly and oiled. The method is specially applicable to objects with sharp corners or edges, or to files and other objects on which buffing wheels ought not to be used. The rusted iron and the zinc make a short-circuited battery, the action of which reduces the rust back to iron, this action continuing as long as any rust is left.

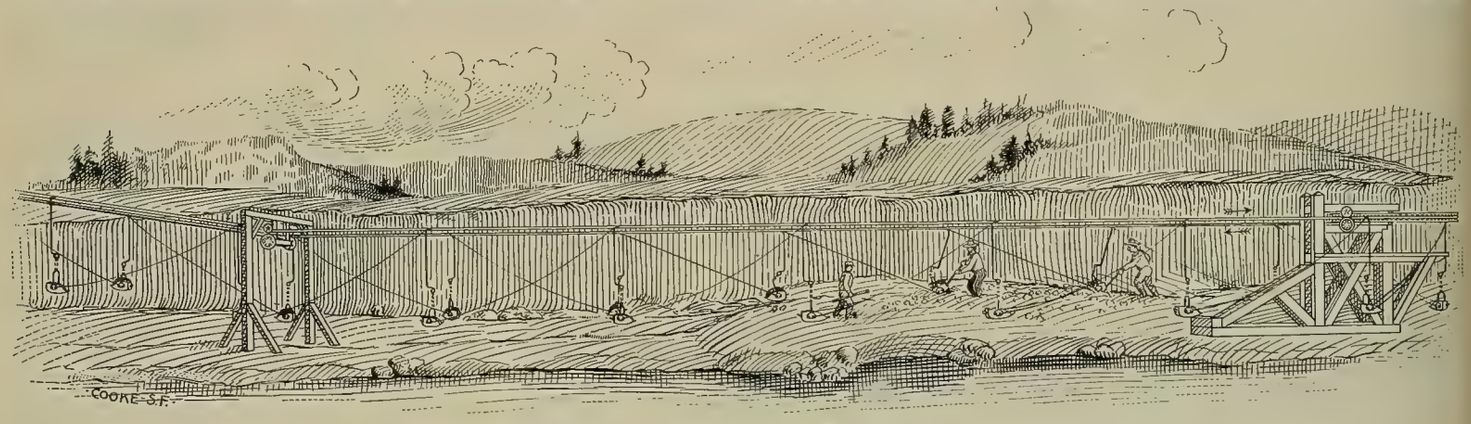
AT Seattle, Wash., last Thursday the Alaska Traffic Association was formed to control rates from Pacific coast points to points on the Yukon river. Transporting companies of Seattle, San Francisco, Vancouver and Portland have agreed to abide by its decision to establish a rate of $275 from St. Michaels to Dawson. The rate from coast points to Dawson was made $300 for first-class accommodations on the larger steamers. The second-class rate was placed at $250, so that it makes no difference to the association if the tramp vessels make a $10 rate to St. Michaels, as prospectors will have to pay as much to get from the mouth of the Yukon to Dawson as they would from Seattle. The freight rate decided on was $10 per hundred from Seattle to Dawson. A committee was appointed to decide on rates to be charged by steam schooners and sailing vessels. The Alaska Commercial Co. was not represented.

IN the U. S. District Court of California this week were convicted three Chinese, arrested at Gold Run, Placer Co., for "mining by the hydraulic process without the necessary permit under the Caminetti law." One of the witnesses for the defendants stated that the Chinese were not hydraulic mining; that they only thought they were; that hydraulic mining always paid a dividend; that defendants derived no profit from their efforts; hence they were not engaged in "hydraulic mining." But the judge was not impressed with that novel line of argument.

THE following may be taken as representative of the chemical composition of granite and syenite: Granite—Silica 72.07, alumina 14.81, peroxide of iron 2.22, potash 5.11, soda 2.79, lime 1.63, magnesia .33. Syenite—Silica 59.83, alumina 16.85, peroxide of iron, 7.01, lime 4.43, magnesia 2.61, potash 6.57, soda 2.44.

A New Use of the Wire Cable.

Herewith is illustrated A. S. Hallidie's system of collecting and transporting earth and other material by means of an endless wire cable moving overhead, and driven by steam or other power. The earth, gravel or tailings are scooped up by scrapers, very much in the same manner as by horses, only that, instead of horse power, steam or other power may be used and the hauling done by a steel wire rope. From the illustration it will be seen that the scrapers are guided by a man armed with a piece of gaspipe about 4 feet long, which he slips on to the projecting finger on the back end of the scraper and regulates the depth of the scoop and the place where the scooping is to be done. The scrapers are hung to clips secured to the cable, about 15 feet apart. The larger is of steel, and rigid for about half way down. The lower half is flexible, and consists of a piece of flat chain that allows the scraper to adjust itself to the work to be done, and which can be raised or lowered at will. The scraper is hung on double trunnions, which permit of a free movement, but give a steady base for the scraper to hang on after it is loaded and on its way to the dumping place. The pulling of the scraper is done by steel draft ropes, which connect each scraper to the clip on the main cable 10 to 15 feet ahead, and all the scrapers are connected that way, so that there is a continuous row of them, each scraping up the earth and conveying it to its destination, which may be a mile or more away.



SCRAPING AND CARRYING EARTH BY USE OF A WIRE CABLE.

The cable overhead is supported on sheaves and travels at a speed of about 120 feet per minute; hence there are eight of them passing any given point in one minute, or 480 per hour, and, as they contain about 3 cubic feet each, they will excavate and convey away 144 cubic feet, or 53 cubic yards per hour. The cable is driven by a grip pulley, to which power is applied. The scrapers move continuously the whole length of the line and around the end pulleys. If the ground is hard and needs breaking up before the scrapers are applied, plows are used, which, in like manner, are hauled by the cable, instead of horses. It is a very effective and economical method of handling gravel, tailings and earth, and has the advantage of being able to convey the material almost any distance, and of excavating a considerable depth and width, as the cables can be lowered as well as the hanger, and the supporting frames for the sheaves can be moved as the work advances.

This is one of A. S. Hallidie's recent patents, date April 21st, '96, and the apparatus is worthy of the attention of those interested. A line can be seen working at the shops of the California Wire Works, where its operations will be easily understood. The office of the California Wire Works is at No. 330 Market St., corner of Battery St., San Francisco, and lines of various capacities are manufactured.

THE London *Electrician* says that experiments with iron-nickel alloys have shown that different co-efficients of expansion are obtained according to the percentages of the two metals. An alloy containing 45 per cent of nickel has the same co-efficient of expansion as platinum, and it is stated that this has been confirmed by experiments made at the Reichsanstalt. It is proposed to use this alloy to replace platinum in the manufacture of incandescent lamps.

Age of Specialists.

The mining business of the United States and all countries possessing modern facilities of transportation and ore treatment, with ordinary natural advantages, says F. Hartman, is entering upon a new era. All classes of people who have invested money in mining enterprises have been learning during the past quarter century that mining is a legitimate business, which must be governed by and through the application of business principles.

The people, too, have been learning that the mining business is one which presents a number of branches differing distinctly, each from the other, and requiring in each branch specific knowledge or skill which can be acquired only by years of practical and energetic study and observation in the field of practice. Men whose books treat on all branches of mining have already lost their occupation, and given way to men who have devoted their attention to one special branch or another. Not so long ago as twenty-five years mining companies and mine owners were employing one man to cover the great field which undertook to comprehend the several occupations: civil engineer, mining engineer, geologist, metallurgist, assayer, prospector, specialist on special or peculiar ore occurrence, mill process expert, master of smelting and manager in chief of all matters pertaining to mining and ore treatment.

To-day the manager of a mining enterprise, when he needs a geologist or mining specialist or metallurgist, employs one whose attention is not divided with half a dozen different professions, trades and mechanisms in the mining business. There are several distinctly different scientific lines in economic geology and mineralogy, each of which requires a life's study, leaving little, if any, time for the acquirement of competent knowledge of civil engineering or the mechanism. It is possible, through mechanical genius, to group mechanical operations, even to a combination with the use and economy of electricity. Mineralogy, so necessarily associated with economic geology, links the studies of co-existent sciences, but does not give the student time to sharpen the drills, square a set of timbers, fix the pumps, or survey a prospector's mineral location.

New Responsibilities.

To look over any journal devoted to machine construction is to be convinced by the evidence of almost every page that metal workers have entered upon an era of high development in practice, achievement and production. One of these evidences, says *Sparks*, is in the character of the machinery advertised for sale. It is automatic or universal; improved or quick-acting; or made for high-speed special work. Nor is the advancement confined to machine shop tools, for the march of improvement has also invaded the blacksmith shop, where the "bulldozer," the bender and former, the steam and drop hammer and the special forging machine are, for many purposes, taking the place of the hand hammer and anvil.

It is to be noted, too, that the materials operated upon have likewise undergone a change. Principal among these changes is the use of steel in the place of iron; and not only this, but steel itself has been studied, developed and differentiated until now almost every purpose for which it is used has its own particular specification.

It is to be said further that the employment of higher types of machine tools, as also the severer uses to which materials are now put, require more judgment, intelligence and skill on the part of the manipulator than ever in the world's history before. This being true, what shall be said of the man who must be developed to keep pace with this advancement? Does he realize that conditions have changed or are changing; that the rule of thumb is passing away; that he must not only become master of the new ways of working but also must learn the characteristics of the new materials he works with; that henceforth he is to be a thinking machine and will be called upon to give reasons and forecast results?

If he does perceive his relations to the new order of things, happy and well will it be with him. He will prepare himself for his ever-increasing responsibilities; will read, study and observe; will converse and compare; will make himself over and bring himself abreast of modern ideas and practice.

AT a meeting of the Tri-State Medical Society, April 5th, Dr. J. J. Brownson of Dubuque, Iowa, reported the case of a man who was terribly injured by coming in contact with a live electric wire. He lost one arm and part of his other hand, besides being burned on other parts of his body. The man received 2400 volts and still lived—the greatest number ever received by a human being and recovered from. The next greatest number of volts passed through the human body without causing death was received by a lineman in New York, who sustained a shock of 1000 on two different occasions, and whose miraculous escape from death has earned for him the sobriquet of the "human lightning rod."

THREE kinds of electric telegraphy across space are recognized by Prof. Silvanus P. Thompson—those depending respectively on conduction, induction and wave methods. The last kind has been employed by Prof. Slaby of Charlottenburg in sending intelligible Morse signals thirteen and one-quarter miles, balloons being used to raise the end conductors 1000 feet in the air. The signals were thus transmitted about seventy times the base line, but Marconi, in experiments at Spezzia, has sent them 500 times the length of the base line. Prof. Oliver J. Lodge has taken the first steps toward synchronizing the transmitting and receiving instruments, causing them to respond only to the waves of the period to which they are tuned. Prof. Thompson believes we may develop the conduction or induction methods so as to communicate between England and India or Cape Colony much more cheaply than by submarine cable, but doubts whether—on account of the earth's curvature—it would be practicable to cover such distances by any wave method.

Crude Petroleum and Crude Methods.

The current number of the "Memoirs of the Geographical Survey of India" has a monograph on petroleum in Burmah.

The methods of mining employed there are primitive, there being not the slightest difference in the method of sinking an oil well 100 years ago and that at present used. A brief outline will be read with interest by Pacific coast miners:

A hole 6½ feet square is dug and lined with wooden square set timbering. The tools used for digging consist chiefly of a chisel-shaped iron shoe fixed to a heavy club-shaped wooden handle. The iron shoe is round, slightly tapered and ends in a double-pointed edge. This tool can, of course, be used only in the softest strata. When hard beds are encountered, a lump of iron weighing 150 pounds, pierced at the upper end to allow a rope to pass, is suspended from a beam laid across the well. The rope is then cut, and the iron falls with sufficient force to produce a considerable hole in the hard rock. As the fall of the iron is so directed that it eventually strikes every point of the bottom, the bed is broken through, but not without great loss of time, for every time the weight has fallen a man is obliged to go down and fasten it to the rope, that it may be hauled up again. The appliances used for raising the material are a rude windlass, a leather rope and an ordinary earthen pot. The miners are lowered by a strong rope which ends in two slings, through which the miner's legs pass. At a given signal the coolies holding the other end of the rope gradually lower the miner into the well. The work of hauling him up again is facilitated by an inclined plane down which the coolies—often eleven in number—run, thus pulling him up more by their weight than by their physical strength. As the time the miner stays below is very limited, on account of the noxious gases, he would not have time, coming from the bright glare of day, to get his eyes accustomed to the darkness. By having his eyes previously tied up, he is enabled to see when down in the well. Before going down he puts on a quaint cap of palm leaves to protect his head from falling stones. The most remarkable feature is the exceedingly small percentage of useful time during which the man is engaged in digging. It varies from 18 to 10 per cent of the total time. This applies, of course, to wells that have reached the oil-bearing stratum. In the upper stratum a man may stay down for hours without being troubled from want of air. The cost of a well up to 250 feet may be estimated at 1200 rupees.

Mining Summary.

CALIFORNIA.

Amador.

Record: The Wildman-Mahoney three-compartment Emerson shaft is down 100 feet. A. Caminetti has taken possession of the Centennial mine, under bond to a San Francisco company, with T. Dillon Supt. The shaft will be kept clear of water. In April at the Potazuba they extended drift 69 feet; total length from shaft, 315 feet. At the Lincoln mine it is expected to have the new hoist ready to start up this month. The shaft is retimbered 40 feet.

Dispatch: At the Amelia mine work in the shaft is progressing. The shaft is now down nearly 600 feet.——At the South Eureka the contractors have completed the sinking of the 300 feet in the north shaft, and a station is being cut at the 1400-foot level preparatory to drifting. The South Eureka is a dividend-paying property. It has been in operation since '91. After about three years' work a body of ore was found and a 20-stamp mill erected. For several years after the mill was built the mine paid running expenses and has begun to reimburse the owners for the outlay of money expended in prospecting. The Gates canvas plant nets the company about $100 a month. The mill is run by electric power and the hoisting machinery is run by water power. There is a second shaft which is down 300 feet, and a drift connects the two shafts. Pay rock has been taken from the drifts in the south as well as from the north shaft. The mine is owned by a San Francisco company.——At the Iron Mass mine, near Volcano, they are stoping from the 309-foot level. The rock is of good quality.

Republican: Improvements are being made at the Ohio mine. Two shifts have been at work for several weeks. New ground is being explored with good prospects.——Work has been going on at the McIntire for two weeks in the old shaft, from which a drift 70 feet is being run.——Another contract has been let for further development of the Holliday mine, and probably two shifts will be put on. The shaft is down 65 feet.——At the Oneida two drifts are being run from the 1500-foot level, one north and one south. A small vein is being followed which it is believed will develop into a large ore body. Twenty-five men are employed.——At the Pocahontas three drifts are in progress—one from the 200, one from the 300 and one from the 700-foot level.

Butte.

The Costa Co., which for the past two years has been operating near Cherokee, will remove the blockade from the head of the big bedrock tunnel which drains the Spring Valley mine. This blockade was caused some years ago, by the slides from Table mountain filling the cut which led to the mouth of the tunnel. The object in opening this cut is to secure the gold that was left in the old flume. ——The Fall River quartz properties above Lumpkin will be worked this season. F. Elliot is manager.

Calaveras.

The Albany Flat and Storm King quartz mines, near San Andreas, have been bonded by D. Rolleri to the Nellie M. Co. of Stockton for $15,000, one-tenth down, the remainder on or before Feb. 3rd, 1900.——The Greek mine has temporarily suspended operations.——The monthly output of the Utica at Angels is said to be $200,000. About 450 miners are employed in the camp.——The Oriental, near West Point, is producing good rock. Shipments to the smelter gave returns of $130 to $180 per ton.——Fields & Porteus are developing their claim near Skull Flat. The ledge is from 6 to 14 inches wide.——The Scotch Co. is developing the Bay Horse and Henry mines.——R. Nixon is developing his property near Angels. The shaft is about 90 feet deep and a level has been run 60 feet.——The old Champion is being reopened by a Colorado company.

El Dorado.

At Grizzly Flat pumping the water from the main drifts of the Mt. Pleasant mine progresses. The gravel mine is working twenty men on paying gravel.

In the Hill Con. mine near Placerville a 24-foot ledge was discovered which with the exception of an 8-foot stringer running through it is of good milling quality.——The *Democrat* says that the Omo mine near Fairplay was sold last week for $40,000. W. F. Lupold, it is locally reported, has sold his mine near Omo to I. Monroe of San Francisco.——Croft & O'Brien found a good ore body near Georgetown, which is 14 feet wide.

Fresno.

Near Auberry the Table Mountain M. Co. is developing its property under the management of C. Knepper.——Johnson & Sullivan are running their mill night and day.——Pinnell & Landrum have bought the Boulder Gulch placer claim.——The river miners are expecting low water in the San Joaquin this season and are making preparations.

Kern.

The Waugaman mine, on Greenhorn mountain, is sold for $45,000 to Los Angeles men. This included about $11,000 worth of machinery. The milling test went $40 per ton.——J. B. Clifton, placer mining near Garlock last week, picked up a nugget on the Grenada claim. It was flat and thin, of irregular shape, 6 inches in length and 2½ inches wide; it weighed 15¾ ounces and is worth $250.

The Rand: The Red Dog mill at Johannesburg has run for the last ten days on ore from the Butte mine that averages over $62 to the ton.——A company is trying to bond the Pinmore mine which belongs to the Ashford M. Co. This mine has a blanket ledge and about 1000 feet of tunnels and inclines.——The St. Elmo mine has shut down, as the Boston & Famosa M. Co. could not afford to ship to their mill at Victor with a raise of $3.25 per ton on freight.

Miner: H. R. Bacon has started development work on his Republic group, and the shaft is down over 50 feet. A mill run of fifty tons will be made to test the worth of it, while the sinking of the shaft will be prosecuted.——Kleist and Faris have sold their wells to the Yellow Aster Co., which gives that corporation an abundant water supply for any emergency. Development work is being prosecuted.—— The run of Blackhawk ore turned out something over $100 per ton.——The Yellow Aster people are surveying for a reservoir site at their wells, preparatory to piping the water to their property on Rand mountain. Rumors of building a mill are premature, though this may be expected soon. It is probable the mill will be forty stamps and so constructed that sixty more may be added.

Mariposa.

In the Geary mine near Mariposa they are down about 90 feet and have a 4-foot vein of good milling ore. They are crushing fourteen tons of ore in twenty-four hours.

Mono.

In the Dunderberg, near Bridgeport, the new tunnel is in nearly 600 feet and is being pushed. The company have in contemplation the running of a new tunnel from Green creek to cut the ledges at depth.

Napa.

The following is the number of flasks of quicksilver shipped from the local mines during the month of April: Napa, 600; Ætna, 230; Great Western, 81; H. B. Lawley, 2; total, 913; an increase of twenty-five flasks over the previous month's shipment.

Nevada.

The North Bloomfield M. Co. will run a bedrock tunnel 800 feet at the Malakoff mine, to be 3½ feet at the roof, 6 feet bottom and 6½ feet high in the clear or inside timbers where timbers are needed.

June 1st the Electric Power Co.'s dam and reservoir at Rock creek, near Nevada City, will be finished. It will be 40 feet high, 260 feet long, 18 inches thick at top, 56 inches at base. It is calculated to hold sufficient water to furnish 1000 H. P. seventy days.

The Central mine, near Washington, has been bonded by a company represented by D. N. Cofiin and will begin work June 1st. The property has not been worked for some years. The bond calls for $20,000.

The La Belle quartz mine on Deer creek, J. L. Postlewaite Supt., is being worked by a Chicago company. Twelve tons sample ore yielded $20 per ton.

The Champion mine has temporarily shut down the 40-stamp mill pending the construction of a new flume.——The Reddick gravel mine continues its output of good gravel.——Poorman & Hastings, operating the Milliken Ranch drift mine, near Nevada City, struck the channel last week. The Manzanita Co., adjoining them on the west, will resume operations.——The Omaha Con. M. Co. at Grass Valley are adopting electric power and installing a 90 H. P. motor.——L. L. Meyers has bonded the National quartz mine, near Graniteville, and begun development work. G. H. Nihell is the Supt.

Placer.

The tunnel of the Eureka drift mine was finished to the 3000-foot mark. An upraise was started in soft rock, requiring timbering.——About thirty men are at work on the Cash Rock, near Forest Hill. They have completed their cribs for the dam and will soon commence operations in the bed of the stream. ——A contract has been let for 250 feet of tunnel on the Ralston mine at $4 per foot.

The *Herald* says that Leahy & Co. have struck a rich gravel channel on their claim near Rocklin. They prospected the gravel which they found to be 100 feet wide and 70 feet from the surface. They sunk a shaft and found the gravel 3 feet in thickness and of good quality. They have completed a steam hoist and as the gravel is of a soft slaty formation it will be worked for the present in an arrastra.

Sentinel: This season has been disastrous for hydraulic miners in Placer county. Fourteen permits to mine by the hydraulic process were issued by the U. S. Debris Commission. In nearly every case the pipe lines and monitors were in place behind the accepted restraining dams. Nearly all of these mines have been unable to turn on water. The only notable exception has been the Polar Star hydraulic mine at Dutch Flat, which has used 2000 inches of water for a portion of each day during the winter.

Other mines have also suffered on account of scarcity of water. W. S. Davis, who is working Texas Bar, has received notice from the California Water Co. that water cannot be supplied this season. He is removing his machinery from the river.——From the present outlook the Bear River Hydraulic Co., operating on Bear river, near Colfax, will not resume work this spring, owing to the short supply of water.——The Morning Star and Big Dipper drift gravel mines are equipped with machinery for use of steam power to run their stamp mills.——Much development work will be prosecuted this season by companies owning gravel and quartz properties on the upper Iowa Hill and Forest Hill Divides.

Plumas.

A diamond drill has been set to work in the Jamison mine.

San Bernardino.

P. Kahl is successfully working the tailings of an old silver mine near Fenners. He is using a dry concentration process.——Reed Bros. have found a property on the desert in the Virginia Dale district from which they took $300 last month. They found pieces ranging from $1 to $8.

San Diego.

The High Peak mine at Julian has resumed work.——The shaft on the Elebeda mine has reached 200 feet on the vein.—The Alpa has a crosscut tunnel 230 feet long tapping the ledge.

Shasta.

It is locally reported that W. R. Hall has made a strike in his mine at Hall City; the ledge is 2 feet wide and the ore assays from $50 to $100 per ton. —The Mountain Copper Co. will put in a pumping plant of sufficient capacity to furnish the smelter with all the water required.

Salee & McDonnell are developing the Bully Hill mine near Copper City. They have a ledge of copper ore in the drift, 1200 feet from its mouth, carrying native copper.——At Whiskeytown Bishop & Davis discovered a 5-foot ledge of free-milling ore of high grade. —The 18 stamp mill of the Niagara Co. at French Gulch has started on good ore. Twelve men are employed in the mine.

Searchlight: The Black Diamond and White Cloud mines, near Muletown, have eight tons of ore on the dump that averages $100 to the ton.——Near Whiskytown a strike was made of a ledge 5 feet wide that prospects in free gold.——DeVinne & Co. started an arrastra of five tons capacity.——A strike was made at the Milkmaid mine at French Gulch of a 7-foot ledge of $60 rock on the 200-foot level. This property is being developed in a systematic manner under the new management.——The bondholders of Ellery Bros.' mine at French Gulch have discontinued work.——Valuable ore is being taken out of the old Deming property from an abandoned tunnel. ——The mine owned by Simmons & Watson is yielding paying rock.

Sierra.

Work is resumed on the Alta quartz mine, near Alleghany City. J. W. Parsons will have charge of the work.——The Los Angeles men who bonded the Kenton quartz mine at Alleghany will develop it.

Siskiyou.

The American Bar claim on the Klamath river is yielding good returns, and work is prosecuted day and night, with thirty-eight men employed.——On Indian creek, Scott Valley, water is scarce—hardly enough to supply the arrastras for crushing purposes.——The San Francisco company operating the Wright and Eastlick mines at Oro Fino, working with the Evans elevators and giants, has a good supply of water in the ditch from Salmon mountain, but the season will be shorter than usual.——At the King Solomon mine, water is getting short, but the company intends running a tunnel to gain more water, so as to have enough for the steam engine and batteries.

The Yreka paper hears that J. Daggett intends starting up the Black Bear mill at Salmon river shortly in crushing quartz taken out during the past winter.——The wingdam of the Pacific mine at the mouth of Humbug has been completed, and foot dams will be built to permit pumping out and hoisting pay gravel.——Claims below on the Klamath river are in operation for hoisting, and are expected to pay handsomely this season on account of low water affording excellent opportunity for successful working.

News: Isgrigg & Carpenter are developing gravel and quartz claims on Soda creek.——Crowley & Co., on Hungry creek, have completed their tunnel to a distance of 600 feet. ——The Manzanita Bar, Benz Bar, Beebe Bar and McConnell & Quinn mines, on the Klamath river, are working.——The Yreka Co., near Yreka, have their tunnel in 350 feet. The prospects are improving.——W. C. Stanley upon his quartz property claims to have 200,000 tons of ore in sight. He intends to erect a 60-stamp mill this summer.——Williams & Aldridge struck a ledge on the North Fork of Humbug that goes $30 per ton. The vein is about 18 inches in width.——H. Finley has a force at work on his Lankey Bob property in White gulch. A 16-inch vein has been uncovered that assays $50 per ton.——Brown & Reeder cleaned up $700 from a short run of their mill in Fool's Paradise. Their ledge is 14 inches wide and yields ore averaging $16 a ton.——At C. B. Poole's mine, on Hungry creek, the ledge at the end of the 800-foot tunnel has widened to 8 feet. This claim has been bonded for three months for $50,000.—— W. Shurtleff is sinking a shaft and running a tunnel on Humbug. He has forty tons on the dump which will go $10 to the ton.

Reporter: The Salmon River M. Co. will commence work on the Gold Hill mine. The flume they are building will be four miles long and will be finished about the 1st of July. They have twenty men working on it.——Work on the tunnel at the Know Nothing creek is being continued. It is in 200 feet.——At the Hathaway Bros'. mine, which made a $7000 strike last summer, they are taking out ore. They handle three tons a day by the arrastra process.——At the Crapo mine, on Salmon river, they are hydraulicking with success. They are employing five men and expect to have water enough to run until the 1st of July.——Allen & Owen at Quartz Valley cleaned up $1300; some of their ore yielded $75 per ton.——They are hydraulicking at the McNeil mine with good results.—— The Gold Ball mine has ten stamps going night and day out of the twenty capacity of the mill. They expect to be able to obtain water for about six weeks yet.——The tunnel on the Corey mine has reached 300 feet.——At the Hardscrabble mine, French creek, they are taking out ore that runs $22 per ton.——A. Garrett, on his claim at Hamburgh Bar on Klamath river, has commenced hoisting gravel. The low water this season will enable him to work his force with success in bottoming the rich gravel along the bedrock in the channel of the stream.——Jillson & Roberts intend adding ten more stamps to their quartz mill at the old California Queen mine, near Henley. They are working a large force day and night, and the quartz taken out is reported yielding $100 a ton.—— The gravel taken out of the new shaft of the Greenhorn blue gravel mine is said to be rich.

Trinity.

In the vicinity of Junction City, the *Searchlight* says, only the French mines are operating and they are suffering from the short supply of water. The Haas mines, which usually cease operations in July, are making their final clean-up three months earlier this season. The Chapman and Fisher mines have closed down, as also numerous other properties. The season has been a disappointment. ——At Junction City the Cle Fse flume trestle, crossing Canyon creek, gave way 40 feet, cutting off the water supply at the mine. The flume will be replaced by pipe.

P. Marks discovered a 4-feet ledge near Trinity Center which is said to yield $35 per ton. He is making a shipment of silver ore to the smelter.

The Brown Bear mine and mill closed last week for general repairs, to be closed for three weeks. The company has kept a force employed on company work and leases and produced good values the past year. Development will be continued on the seventh level on a prospecting tunnel, which is in 700 feet and is expected to reach the Monte Cristo pay chute at 1300 feet.——The crosscut tunnel on the Boulder mines has reached 700 feet and is being pushed at the rate of 7⅛ feet per day.

Tuolumne.

Democrat: In the Alameda mine the main shaft has reached 650 feet, at which point sinking was discontinued, but will be resumed soon, when it is proposed to drive to the 800 mark. At the 600 level the vein is being drifted on north and south, while at the 300 crosscutting the ledge was commenced last week. The vein varies in width from 2 to 12 feet; it is expected the quartz will mill from $8 to $10 per ton. The ore contains high grade sulphurets. The mine is soon to be equipped with a 20-stamp mill.——At the Providence operations are being pushed. The 10-stamp mill will be running within thirty days. Ten stamps will be added in three months. A quantity of ore is on the dump.——At the Sell mine over 500 feet of the old tunnel have been straightened and retimbered. In the meantime ore is being taken from the stopes. The new mill was started up last week.

Yuba.

(Special Correspondence).—The recent discovery of an ore body of some magnitude and value in the Pennsylvania mine at this place is significant in several ways. After a large outlay of money in development work, the company sent in an expert, upon whose report it was concluded to abandon work. With his usual tenacity, however, Mgr. F. W. Page persisted in pushing the work, and, from some indications in the formation, he thought he felt warranted in his conclusions. He realized that cessation at that time meant condemnation of that portion of the country as a mining section. A day after notice had reached him to close down he opened a 12-foot ledge of ore, from which he milled 650 tons, that returned something over $5500, and, in addition, he saved seventy-two sacks of high-grade sulphurets. This ore body was discovered on the 800-foot level, and from present indications it warrants the prediction that the mine will give good yields for a long time. The ore is not all high grade; there is much of it that will run from $4 to $8 in free milling, with a fair percentage of high grade sulphurets.

Brown's Valley, May 9th, '98.

NEVADA.

(Special Correspondence).—The Boston-Nevada Copper Smelting Co. at Yerrington has closed down indefinitely.

Yerrington, Nev., May 5.

The Nevada M. Co., near Pioche, last week sent 1000 pounds of auro-cyanides, containing a small percentage of silver, to Utah. The company is also shipping high-grade ore.—— The gold mines in Western Nye look well; the Bell mill is running constantly, bullion is shipped regularly. The Knickerbocker mill will run this season.

W. Whalen is developing his property near Alpha.——On the Serpent mine, near Osceola, Wilson & Co. have several hundred tons ready for milling, which carries good values. They are erecting a small mill.——The Gold Crown M. Co. at Aurum is developing a silver property that carries ninety ounces silver to the ton. The ore is shipped to Salt Lake for treatment.——The Adelphi M. Co. of Smith Valley has been reorganized and will erect a stamp mill.

The Heleza M. Co. at Genoa proposes piping water four miles to the mine, using 6-inch pipe.——The Mountain City *Times* says that a porphyry dike in that neighborhood which has been considered of no value shows after a number of assays that it contains 100 ounces of silver and from $5 to $20 gold per ton.—— Ten tons of ore from the old Prince mine near Empire milled $10 per ton.

OREGON.

Near Pendleton Perkins & Atkinson have sixty acres of gravel 30 feet deep. They contemplate putting in a hydraulic plant.——The Mormon mines, owned by B. F. Grant, are said to have $300,000 invested in mining property, which consists of four square miles of ground, six miles of ditch, seven miles of steel pipe, a large reservoir and eight giants. —— Blalock Bros., operating near Grants Pass, made a cleanup of $1000 in gold. One nugget weighed $75.——The E. & E. mine at Bourne is in operation again after a suspension of work for several weeks, with thirty men. It is not yet known whether it will be conducted by the former lessee or whether the owners will take charge.——Utah capitalists are said to have bought the Claiborne mine, near Baker City.

WASHINGTON.

(Special Correspondence).—A company has been organized in Snohomish to work the National, Webster and Morning Star quartz mines near Mineral City, where a 25-ton daily capacity smelter will be built. The mining company does not pay for the smelter until it has run thirty days and shown its ability to save 95 per cent of the assay value. Considerable work has been done on the mining properties. The Morning Star is galena, the National carrying lime and the Webster a

gold value. Charcoal will be burnt on the company's property. —— Meyers Bros., at Meyers Falls, shipped sixteen tons which assays from $20 to $100 per ton.

Snohomish, May 3rd, '98.

At Republic development work has begun on the Republic No. 2 group, and tunnel work will be started at once. The tunnel will be 250 feet in length.——A new discovery of free milling ore is reported near Republic, of which top rock is said to assay from $2 to $9 per ton.——The Little Cove will soon have their shaft clear of water and be ready to go on with development work.——The Young America at Bossburg is shipping regularly. ——The Bonanza Co. has resumed operations on an extensive scale and has become a regular shipper. The work is down 400 feet and has 30 feet of ore.——Work has begun on the Eureka Queen, near Republic.——The Everett *Independent* states that the Sunset Copper Co., near Index, has struck a ledge which carries good ore. This is the second lode cut in running this tunnel.——The Copper Queen ledge has widened to 14 feet.

At Northport the fire caused a loss of about $75,000, of which there is $8000 insurance.

The Snohomish M. & M. Co. has contracted with the House-Dupae Co. for the erection of a twenty-five-ton daily capacity smelter at Mineral City.

BRITISH COLUMBIA.

The Smuggler Co. of Fairview have completed the survey of their new mill site and the tramway which will convey the ore from the mine to the mill to be erected on the bank of the Okanogan river.——Notwithstanding the big cave in the Le Roi, it shipped 956 tons of ore the last week in April to the Northport smelter.——By the middle of summer it expected that 1000 men will be employed in Ymir.

The Cariboo hydraulic mine near Quesnelle has commenced operations for '98. They turned on the water April 14 and are running night and day with a good head of water. From the report of Mgr. Hobson for 1897, the following is taken: Time occupied in washing, 111 days; quantity of water used, 223,416 miners' inches; quantity of gravel washed, 840,130 cubic yards; gold product for season, 8078 ounces; value of gold, $138,559.79; total expense of operating, $91,311.77. The water supply is from a ditch seventeen miles long, with a capacity of 3000 miners' inches. The former holds 304,000,000 cubic feet, equal to 140,741 miners' inches, and the latter 102,000,000 cubic feet, equal to 75,000 miners' inches; they are bringing in another ditch from Moorehead, at a cost of over $100,000. An earthen dam 485 feet long, or 50 feet extreme height, and containing 50,000 cubic yards of embankment, will retain a reservoir of water 35 feet in depth, covering an area of 620 acres, and will hold 550,000,000 cubic feet of water, equal to 254,629 miners' inches, or 127 days' water of 2000 miners' inches daily. The water from the reservoir will be delivered at the mine by a ditch 10½ miles long, the dimensions of which are 11 feet top, 5 feet bottom, 3 feet depth, grade 6 feet per mile, capacity 2500 miners' inches of water. The property comprises 446 acres, that extend along the ancient river channel 1⅞ miles. This company is consolidated with the Eureka mines, on Moorehead, with leases covering three miles of an ancient channel. The capital stock of the consolidated company is $5,000,000.

At New Denver the working of the Mollie Hughes and adjoining properties has developed such indications that every foot of ground on Goat mountain has been staked and in some instances twice staked. The prosecution of work on other claims near by has begun.——Four Mile creek mines are putting on more men and will increase the forces on the Comstock, Emily, Edith, Vancouver and Wakefield as soon as the roads are in condition to travel.——At Ten Mile more than 1000 tons of ore from the Enterprise await shipment. The work being done is all developing and blocking out ore bodies. Other Ten Mile properties are making advancement with the renewal of spring work.——Work on the Trail smelter at Rossland progresses and the furnaces will be blown in about July 1, when ore to the extent of 4000 tons will be on hand. The process of roasting ore has commenced. The smelter company has contracts for the purchase of ore from the War Eagle, Cliff and Center Star companies.——At Ymir work started on the Blackcock. This property was bonded to the Hall Mines, Limited, for $70,000. A force of thirty men was put to work.——Bam & Grantham made another strike on the El Dorado. The ore runs high in gold and copper.

At the B. C. mine, near Grand Forks, 1000 tons of ore is on the dump.——The C. & W. E. Co. has secured the Glasgow group, near Ymir, for $3500 cash. The property has a 6-foot ledge which assays $20 in gold per ton.

The *Spokesman-Review* says that the contract for the sale of the Le Roi mine and smelter to the B. A. Corporation has been signed in London and $500,000, the first payment, has been deposited there to be available by the Le Roi G. M. & S. Co. as soon as the final papers are signed. The sale is at $3,000,000 for the mine, smelter and other holdings, and the payments will be made at the rate of $500,000 per month. The smelter at Northport is to be transferred with the other property, but cannot be legally held by the London corporation, which will make the formation of an auxiliary company necessary. Until such a company is formed, the property will be transferred to a trustee.——Ore shipments for the week ending May 7th from Rossland were 2262 tons. Shipments for the same week last year were 1240 tons. Shipments since January 1, 1897, have been 100,203 tons.

THE KLONDIKE.

F. Banta of Fresno, Cal., is at work on Hunter s creek. He says: "I took a lease or lay on claim 41 on the 13th of November. We get 60 per cent of the gold we take out. On December 1st we began work. We put down five holes without striking pay dirt. The holes were from 20 to 32 feet deep. I started a hole at another point and the first pan I got out on reaching bedrock at 22 feet went $2.45 in gold. We are now getting all the way from $1 to $60 to the pan. The gold is coarse and one nugget that we picked out is worth $40.85. We are taking out from $500 to $1000 a day from that hole and are sinking two more holes. We have until June 1st to drift and are going to try and work out our claim by that time. If the pay continues as good we will get out between $75,000 and $150,000. C. Walters had a lay on claim 42, adjoining ours, but could not find the pay streak. He is now working for us. Nothing in the eatable line can be had for less than $1 a pound. It costs 25 per cent to send gold out from here by either of the two trading companies. I think I will carry the most of mine out myself."

H. R. Miller was at Skaguay May 2 from Dawson to the coast over the trail. He left Dawson on March 31. It is his opinion that navigation will be open between Dawson and St. Michael about June 1, or two weeks earlier than usual, owing to the warm weather that prevails on the Yukon. He looks for a general break-up of the ice this side of Dawson before the middle of May.

Miller says the steamers Bella and Weare will be likely to take the first consignment of gold this year to St. Michael. They are now with the Victoria and St. Michael in the ice near Circle City. When the river opens the Bella and Weare will go to Fort Hamlin for provisions, taking out the gold on their return trip from Dawson. The Victoria and St. Michael will steam to Dawson, waiting there to take prospecting parties to the Stewart river and other recently exploited territories. Fully $20,000,000 in gold will leave Dawson this summer, according to Miller's statements. No new strikes have been reported near Dawson, but Miller says that recent developments show that Sulphur and Dominion creeks are each fully as rich as Bonanza. He confirms the story of big discoveries on Monte Carlo island.

ALASKA.

The Alaska G. M. Co. of Indiana, capital stock $1,000,000, Prest. S. N. Chambers, Indianapolis, Sec. C. W. Moores, has organized to work properties.——Between the Comet and Jualin mines at Berners bay a tunnel 1500 feet long, 7x8, has been begun. The present intention is to erect ten stamps, a mill to be built to accommodate thirty.

IDAHO.

The Banner mine near Silver City cut the vein with a crosscut tunnel 657 feet in length at a vertical depth of 300 feet. The ore is said to be of good grade and fair size.——The Cumberland mine shipped 100 tons of ore and continues development work.——The Little Giant property near Warren has produced $250,000 from 150 feet of stoping ground, is being developed to a further depth of 150 feet by the owner, M. Reibold. This mine has a first-class hoist, a 5-stamp mill and a saw mill. The ore body on the 160-foot level shows 18 inches of ore which will mill $160 per ton. ——The Iola property, owned by the Honest John Co., shows promise of producing bullion after the new mill is set up. There are thirty men employed. The vein averages about 3 feet all through. The ore runs $30 per ton.

The DeLamar Co. declared a 12-cent dividend at the April meeting of the Board of Directors. The total product of the property for the month of March was $26,657; total expenses for the month, $19,422; net proceeds, $7235. Of the gross product $16,413 was from 900 tons of ore worked by the partially completed leaching plant. The entire leaching plant is not yet working. Except as to the power plant and the building, the mill will have been revolutionized when again running full handed.

UTAH.

At Silver City the mines employ double the number of men that they employed a year ago. The Swansea found a new vein on the lower level whose continuity is shown over 600 feet.——The Four Aces made a two-carload shipment, the values running in silver and lead, with a small percentage in gold.

The main shaft at the Bullion-Beck is being put down with dispatch to make connection with the ore bodies at a depth of 1300 feet. The ore body has been stripped for 240 feet, and for that distance the vein shows an average width of 20 feet. With present facilities for the extraction of ore it is impossible to raise the tonnage desired by the company, and to remedy this connection with the bodies on the 1300-foot level is being pushed.——At the property of the Orient M. Co., West Tintic, ore is being hoisted that shows thirty ounces silver, 20 per cent lead and $13 gold per ton. In the opening of the old workings a small streak was found that increased to 6 inches and widened into 18 inches. The ore shows a gross valuation of $53.80 per ton.—— The stockholders in the Beaver Lake M. Co. decided that with a smelting plant its properties can be made lucrative, and decided to take up the matter for definite action on May 30th. A report was submitted by Treas. Morris which showed that during the year $2495 had been expended on development work, and that the year closed with the company free from indebtedness. He thought that $8000 expended on furnaces for the smelting of the copper ores would soon pay for itself.——According to the local samplers, ore was last month received from twenty-six mining properties in Bingham, eight more than at the same time last year.——J. M. Bailey of the Queen of Sheba, Deep Creek, says that the failure of the Havens option was due to the failure of the process in use to save more than 20 per cent of the values. The volume of water is sufficient to provide for the handling of forty tons daily. The ore has an average valuation of over $8 per ton and over 2500 tons were put through.——The motion for a new trial in the case of Wilson vs. Triumph M. Co. disclosed that ore had been found which shows from 105 to 315 ounces silver per ton. In his suit against the company the plaintiff asked possession of the Mormon Chief, which was claimed by the Triumph people, under a relocation made by him and for damages in the sum of $1000. The jury found against him. The Triumph people now confess that on the eve of the trouble with the plaintiff, and at a depth of 100 feet in the shaft, it found 15 inches of ore, the assay from which showed 252 ounces silver, 7.4 per cent copper and small amounts in lead and gold.

Tribune: Utah's mining output for April was 9,896,715 pounds ore. During the same period there was billed out of the various smelters 4,718,718 pounds gold, silver and lead bullion, 506,666 pounds copper bullion, 192,950 pounds copper matte. The most striking feature in the record is the increase that has been made in the production of copper, which is nearly double the bullion record for April, 1897. There was an equally notable increase in the output of gold. The Ontario mine closed the month with its output reduced to 200 tons of ore, the proceeds of which were about enough to meet the requirements of the payroll and incidental expenses. Its old output was 2500 to 4000 tons a month. The Daly, that once hoisted 2100 tons for the mill and 400 tons for the market, allowed the month to go by without the shipping or milling of a pound of ore.

In the Valeo mine at Park City an ore body was discovered from 4 to 5 feet wide, bearing gold and copper.——The following ore shipments were made from Park City last week: Silver King, 488,520 pounds; Silver King, concentrates, 297,320; Anchor, concentrates, 223,160; Ontario, 45,320; Anchor, first-class, 146,600; Daily lease, 38,750; total, 1,239,670.—— The Dalton & Lark at Bingham is to start up with a considerable force. The 800 level will be pumped out and sinking resumed in the main incline, which has been sunk 850 feet, where some drifting was done and copper ore obtained.——Work has been resumed on the Annie group, near Mercur. The shaft has a depth of 350 feet, and the intention is to continue until a depth of 500 feet has been attained.——The Mollie Gibson group reports the ledge broken into and that it is well mineralized.——The output of the Grand Central mine at Tintic for April was 2100 tons.——The Glasgow & Western E. Co. has made final payment on the Montreal mine, near Milford, and further development will proceed at once. This is a copper property. A smelter will be erected on the ground.

The Utah Queen at Stockton has a fifty-ton shipment of high-grade ore ready, which will net over $6000.——In the Hidden Treasure two outfits are at work and both made shipments this week. Lynch Bros. shipped thirty tons of good ore and Hickman & Peterson shipped seventy-five tons from the same property.—— A seventy-five-ton shipment is being hauled from the Buckhorn, and regular shipments will be made through the season.——The No-You-Don't is shipping an average of seventy-five tons per month.——A twenty-ton shipment will be made from the Lion, and the Argent is shipping thirty tons per month.—— The owners of the Mercur mine were $12,000 in debt before they adopted the cyanide process. Since then they have paid thousands in dividends.——Ore is being sacked at the Northern Light, which averages 250 ounces silver and from $10 to $12 gold per ton.——The Geyser-Marion shipped 700 pounds of cyanides that returned $8500.——In April the Grand Central at Eureka shipped forty-eight cars of ore of an average value of $1000.——In the Sunbeam has been found a 2-foot vein of ore which runs 36 per cent lead and 50 ounces in silver. There is also a very fair grade of copper in the floor of the drift.——A shipment of nine cars of ore from the Bullion-Beck runs 66 ounces in silver, 13½ per cent lead and small percentages of gold and copper.——Sacramento ores show an increase in the quality of the ores, the values having advanced to $10 per ton in gold.——The Dexter Co. opened the month with a shipment of auro-cyanides of the value of $3500 and a gold bar of the value of $2000. The shipment was not a clean-up, but simply taken from the batteries, to be followed by another lot in a few days.

The Supreme Court of the United States has affirmed the validity of the eight hour law in this State. The law was directed particularly toward mine and smelter employers.

MONTANA.

Marcus Daly has filed on 8000 inches of water to be taken direct from the Bitter Root river through a ditch 4 feet deep and 16 feet wide, to be immediately constructed, says the Hamilton *News*. The contract has been let to Messrs. Karlman & Jennings, of Anaconda, the contractors who recently completed the flume for the Anaconda company near Anaconda at a cost of $300,000. The estimated cost of the ditch will be $200,000, the contract calls for its completion by Nov. 1, 1898. It is estimated that 3,000,000 feet of lumber will be used in the construction of the ditch, for fluming, etc., and that much heavy rock work and tunneling will be done.

J. R. McDonald of Milwaukee has arrived at Missoula, and it is said brings with him the necessary funds for beginning work on the Golden Scepter properties at Quigley in Granite county. The Golden Scepter is a phenomenal body of low-grade ore and many thousands of dollars have been spent in getting the property in condition to work. The company failed before completing the plant. A new company has been organized and as but a comparatively small outlay is necessary to complete the work it is anticipated that the mine will be producing bullion at an early date. The camp is back in the hills about thirty miles from the main line of the Northern Pacific. The plant includes an electric railway and one of the largest and finest mills in the State.

Gen. Mgr. Grant of the Parrot Co. has posted notices at the smelter and all of the Parrot properties informing the employes that those of them who wish to enlist and go to the front will find their old places waiting for them on their return from the war. The order applies to every one. The Parrot Co. has about 625 men on its Butte payroll, a number of whom are members of the militia.

Near Neihart a 2-foot vein was discovered in the I. X. L. mine, at 160 feet depth, which gives assay returns of 166.4 ounces silver and $24.20 gold per ton.——The Arkansas mine has found a ledge of considerable width that assays $30 per ton gold.——The Galena mine shipped three tons of ore that yielded $160 per ton gold.

Near Rochester the Nez Perce mine has a shaft 160 feet. The vein is 6 feet wide and assays 60 per cent lead, $2 gold and forty ounces silver.——The Ida Elmore has a vein 8 feet wide, and is a copper producer.——On the Lead Queen there is an 800-foot tunnel and a 200-foot shaft. The ore returns 65 per cent lead, forty ounces silver and $8 in gold. The vein is 5 feet wide.——The Liverpool mine, near Clancy, has resumed work. It has a depth of 460 feet. After it has been unwatered sinking will begin.——Herman & Co. are developing the Red Cloud. They have a shaft 140 feet deep and have had more or less ore from the start. They have several carloads of concentrating ore on the dump.—— The Libby *Montanian* says that during last season the payroll of the Libby mining district exceeded $10,000 a month for the six summer months during which mining was most active, and the most conservative estimate of the money that will be spent in mining this season puts it at $20,000 monthly, while the output of mineral from the camp will be three or four times that of last season. Besides this there will be many new mining enterprises started this year.——Nicar & Co., of South Bend, Ind., are engaged on Libby creek with a number of men sinking to bedrock in various places on their claims and making a thorough test of the ground. If the tests prove satisfactory, the company will put in a $20,000 hydraulic placer mining plant during the coming season.

SOUTH DAKOTA.

Deadwood's smelters have depended entirely upon eastern coke. The Hardin company at that place have bought 2500 acres of lignite coal land fifty miles from Deadwood, and will erect a plant to manufacture coke for the 200-ton smelter which they are about to build. Other plants will be erected there for manufacturing coke by the Hemingway process.

Twenty-five tons of ore are being shipped daily from the American Express group, near Deadwood. The shipment will soon be increased to forty tons a day. The ore averages $25 a ton. The ore body is 25 feet wide and 10 feet thick.——The shipments of ore from the Clinton mine, near Portland, have increased to nine cars a week and the force has enlarged. The Dividend mine has also increased the number of cars to nine a week. ——A force is working in the Golden Sands mine, owned by the Horseshoe M. Co. About twenty-five tons a week are shipped. The tunnel is in between 500 and 600 feet.

WYOMING.

At Sheridan Eastern men propose the manufacture of nickel steel from native copper upon an extensive scale. W. Runk, F. Zint, Highland Falls, N. Y.; W. Ecklin, W. M. Brock, F. Amiraux, Paterson, N. J.; Gen. Mgr., G. F. McLaughlin; H. Schraub, electrician. The company has seventy locations, necessitating the erection of large reduction works, smelters, etc. The motive power will consist of a turbine water wheel of 125 H. P., to be used to generate electricity and also run four air compressors. The compressors will run the diamond drills and will obviate the use of steam. The mines will be furnished with electric lights; automatic conveyors will be used to bring the ore to the surface. The cable is steel wire rope 2000 feet long. Engineer Weist has men surveying and laying out a road from the mines to the railroad. The company expects to employ 500 men.

MISSOURI.

Zinc ore decreased in value $1 per ton during April; highest price $24 per ton; $4 higher than the corresponding month of 1897. Lead ore is steady at Joplin, at $21.25 per thousand pounds delivered.

MINNESOTA.

The Golden Gate M. & D. Co. of Rainy River, Limited, has decided to spend $30,000 to develop their properties.

COLORADO.

(Special Correspondence).—The Hyalite G. M. & M. Co. of El Paso county has been incorporated to operate at Cripple Creek on Gold Hill. The company's property, which is a long lease, is situated on the extension of the Moon Anchor lead and has a cross vein from the Anchoria Leland. The shaft is 135 feet on the vein. The men are crosscutting the vein for the hanging wall, where they expect to find good values. The assays run in gold, silver and rosin zinc and a rare mineral called hyalite, after which the company took its name, is found. The property is equipped with 25 H. P. engine and 20 H. P. boiler.

Colorado Springs, May 6th, '98.

Otto Mears of the Silverton railroad says: "The mining industry in Colorado is more prosperous than ever I have known it to be. The reason is that our mines are mostly owned at home. I believe that fully three-fourths of the mining in this State is being done now by Colorado people. In former years booms were fostered by people going East to sell prospects. Such schemes did not induce Eastern people to invest very much money in Colorado and by reason of the poor returns, such methods tended to injure the reputation of the State. Our own people were backward until the panic came. Then the Sherman law was repealed, Eastern and foreign capitalists thought Colorado would 'go back' and they sold out their mining interests for what they could get. Local men were forced in many

cases to buy and our people turned to mining with the energy of desperation. The result was that in four years Colorado advanced to the first rank as a gold-producing State. It was a blessing to the State that conditions forced the people to depend upon their own resources. Now nearly all the dividends from mining stay in Colorado. Cripple Creek mines pay dividends to Colorado Springs and Denver; Creede pays tribute almost exclusively to Denver; Leadville's paying mines are nearly all owned in Colorado; mines in Boulder, Gilpin, Clear Creek and other northern counties are owned mostly by Denver people and in the great San Juan county I recall only two or three important producing mines that are owned by outside capital. Of these about one-half of the Tom Boy's dividends go to England and the balance stays in Colorado, and the Congress mine in Red Mountain district is owned in the East. Old mines that were abandoned by their non-resident owners have been purchased, reopened and developed by Colorado men with good results."

The shipments from Black Hawk for April were 342 carloads or 5472 tons, an increase over the same month of '97 of 44 carloads or 704 tons.——J. M. Baker, Sr., purchased the Monterey mine for $5000 cash. —During April the output of the Concrete mine was 1700 tons of ore, representing a daily output of nearly sixty tons.— —At the Phœnix-Burroughs and Pease-Kansas mines, near Central City, the April output was 2700 tons.——On the Modoc at Cripple Creek, at a depth of 60 feet, drifts have been extended both ways on the vein. The pay streak varies in width from 1 to 3 feet. The shipments run from $20 to $76 per ton.——Regular shipments are again made from the Hallett and Hamburg. The ore comes from the 270-foot level.——Potvine and Vaine are now in good ore on the Christmas. At the 150 level the chute has been drifted on and the quartz is found fully as rich as in the first level.——Work has been resumed in the Silver Ledge mine and mill near Silverton.——The Gold King has begun a crosscut tunnel, to be driven 5000 feet; it will cut the Gold King vein at a depth of 800 or 900 feet beneath its present workings. Power drills will be introduced and the work pushed. It will afford drainage, ventilation and transportation.——It is locally reported that a strike was made in the Belcher mine that runs ten ounces gold per ton.——A new town named Delia has been started at the head of Fall river, ten miles from Idaho Springs. There are 200 miners working in the district. There is a number of mines, among them the Alice and Chesapeake, located on this part of the sulphide belt.——The Joe Reynolds mine, Clear Creek county, is dropping its 800-foot shaft at the rate of 10 feet a week. The seventh level is being extended east to catch an ore body.

Occurrence of uranium in Gilpin county suggests the possibility of its being found in other portions of the sulphide belt. Its general occurrence is as pitchblende—a black, glossy, sub-metallic appearing substance found frequently in seams and cracks of the vein matter.

The Portland people have closed a yearly contract with the smelter at Colorado City for the treatment of all their ores. It is claimed that they will save $50,000 per annum in reduced rates of treatment.

A two-carload shipment of $60 ore was shipped from the Blue Bird at Cripple Creek. ——The gross value of the output of the Lillie last month was $70,000. This month the production will run from fifty to sixty tons per day, the greater portion of which will be sent to the reduction plant at Colorado Springs. ——Mattoon & Co., leasing on the Star of Bethlehem, are again in good ore. In the 160-foot level a new ore chute was opened up a few days ago. There appears to be about three grades, one running $25 and the other $80.——Scott & Miller, leasing on block 2 on the Colorado City, received from a trial shipment an average value of $60.——The Vindicator Con. Co. will soon begin the erection of a mill for the treatment of the ores taken from the property by the company and its lessees. Five sets of lessees are at work. The company recently paid its first dividend of 2½ cents—a total of $30,000.

Reporter: The Yak tunnel at Leadville is shipping three carloads a week and working with a reduced force. Operations on the head of the tunnel have been suspended for some time. It is claimed this is due to the inability to secure terms from the owners of the territory through which the tunnel passes.

Record: The tonnage treated from the Cripple Creek district for the month of April amounted to 32,000 tons of a value of $1,202,900, as against 30,850 tons valued at $1,123,650 during March. The following figures on the treatment of Cripple Creek ores are obtained from the management of the process plants of this district, Florence and Colorado City: The Gillette, Arequa and Brodie plants handled nearly 5500 tons of ore of a value of $157,000. The mills of Florence, including the Metallic Extraction Co., treated 11,500 tons valued at $365,000, while the Colorado-Philadelphia plant treated 6000 tons of an average value of $25 per ton or a total of $150,000, making a total for the treatment processes of 23,000 tons with a gross value of $572,000. The smelters handled 9000 tons of an average value of $70, or a total of $630,000.——In Gold Hill there are twelve shipping mines. The deepest is the Slide, which has reached 1100 feet. The greater part of the mine is being operated by leasers, though the company is taking out ore from the lower levels, and recently hoisted in one day twenty tons that ran 5¼ ounces gold per ton, taken from the 1000-foot level. All the leasers are doing well, several making $25 per day. The payrolls of the camp include 350 workmen of all grades.——During April sixteen mines of Empire shipped nineteen carloads of ore, averaging from fifteen to twenty tons per car. Shipments in April, 1897, were five cars.

At Crestone Hazard Bros. are opening a quartz vein 40 feet wide, known as the Kinney lode. Specimen assays at the surface run from $8 to $20 gold per ton and eleven ounces silver.——The Thomas Bodkin, owned by D. McLaren, has an ore shoot 75 feet wide that assays from $3 to $10 gold per ton at the surface.——The Blue Bell has 8 feet of ore and runs from $5 to $16 in gold and silver.——The Iowa mine at Silverton gives employment to 150 men. The mine is at an altitude of 12,000 feet above sea level. It has been developed by 8000 feet of tunnels, drifts and shafts. Last year it produced nearly $225,000 in gold, $80,000 in lead, and silver valued at $60,000. The Black Diamond group has been purchased by the company and will be operated in connection with the Iowa. This has a body of gold-bearing ore, similar to the Iowa. The properties adjoin and will be connected by underground workings. About twenty-five men are pushing ahead on the Diamond to expedite the Union. The latter is producing forty to fifty tons of ore daily. In the Diamond there are already 400 feet of ore opened up, and the work of development goes steadily on. The Iowa has a 100-stamp mill in operation.——Near the Iowa is the Royal Tiger, a lead property. It has about 2000 feet of development. The property shows a body of lead varying from 2 to 5 feet in width, running 50 to 60 per cent in that metal, and a per cent in gold and silver. The property has produced in the last six months $50,000. A large amount of ore has been blocked out and a tramway 1600 feet in length is being put up. With the completion of this improvement the Tiger will be able to produce 250 to 300 tons a month.——The Carlton Bros., at Leadville, are shipping about 600 tons of iron per month.——The Arkansas Valley smelter has on its payrolls about 600 men and is receiving about 500 tons of ore daily.

The Anaconda Co. at Cripple Creek is outputting at the rate of 800 tons per month, most of the ore going to the mills.——At the Portland, on the Hidden Treasure, twenty-five tons of carefully sorted sacked ore is in the underground safe, but in all probability the amount will be increased to fifty tons before the trial shipment will be made. Assays on the ore already saved have run all the way from $4000 to $80,000 to the ton.——Mattoon & Co. have reached ore in the Star of Bethlehem with a crosscut at 160 feet, and have started shipments again. They have a chute 3 feet wide that ships in two grades—some ore at $35 and other at $80 per ton.— —The output from the Moon-Anchor last month was close to 900 tons that averaged $55 per ton. The mine has a large amount of ore blocked out in levels run from the incline shaft above the 500-foot point. The new three-compartment working shaft has reached a depth of 460 feet.

Union lessees at Cripple Creek last week shipped forty-seven and a quarter tons of ore, valued at $2426.——Lessees on two blocks of the Hull City placer are shipping 160 tons of $75 ore weekly.——A Vindicator lessee shipped twenty tons of $145 ore from the first level of the old shaft.—— The Wisconsin shipped forty tons of smelting and milling ore.——The Blue Bird of Cripple Creek has adopted the co-operative plan of development. The company will supply the material and the miners the labor. There are 300 miners employed and there is ore in all the levels.—— The annual report of the Prince Albert at Cripple Creek shows cash on hand $17,002 40. They shipped during the year $92,342.50 worth of ore. The increase over 1897 is $6364 88. The company will continue to lease the properties in blocks.— Every mill in the Clear Creek valley, near Idaho Springs, is running full time, with ore enough ahead to insure steady work for the season. Considerable prospecting is being done in that section and surface assays give good returns.

Bride & Gill at Cripple Creek are doing development work on the Wisconsin and production for April was cut down to about 125 tons. They expect by the middle of the present month to resume their regular output of a carload a day. A shipment of screenings made by McCormack & Co. gave returns of $92 a ton. Griswold & Byers are making occasional shipments from their lease on the same property, getting sorted stuff in one grade that runs $75 to the ton. The lowest shipment of this, however, went $140, and the general average was in the neighborhood of $300 a ton.——The Victor mine shipped last month over 3000 tons of mill dirt, about 200 of first and 600 of second and third grades. The output of mill ore will be increased to 150 tons a day.——At Lake City the Yellow Medicine has resumed operations and is employing 100 men. A good grade of concentrates is turned out. The Yellow Medicine is owned by the Colorado F. & I. Co., which company has purchased the Capitol City mine, the latter being one of the rich galena producers in Hinsdale county.——The Lamartine mine at Idaho Springs, with a record of production of $3,000,000, at a distance of 1000 feet from the first ore body has come upon a second, believed to be of equal merit with the first ore chute. In this there is a change from silver to gold.——Near Gladstone, the most productive section of the San Juan between 1890 and 1896, and since practically neglected, new activity is manifest. The title of the Old Sampson, a shipper of earlier years to the extent of a quarter million dollars, struggling in litigation, is perfected, and the property is in the hands of Colorado and Eastern capitalists of means, who are reopening the property.—— The Gold King has been operating all winter, employing thirty-five men, and shipments have been resumed.——The East Monroe at Victor is being worked with day and night shifts and a depth of 230 feet has been reached. Copper ore has been found; assays show values of from $50 to $75 per ton.——At Silverton the Sunnyside Extension has again become a producer. It is said the mill will start the middle of next month for a summer's run.—— The Geyser at Silver Cliff is producing two tons of ore per day from the 2400-foot level. Thirty tons of ore have been shipped, besides the two cars last month.——The Nelson tunnel at Creede has reached 3500 feet.

NEW MEXICO.

Near Santa Rita an ore discovery was made that yields $18 gold and forty ounces silver per ton.——The Hanover, near Silver City, is daily producing fifty tons ore which is shipped to the smelter.——The Santa Rita Copper & Iron Co. is shipping three cars of iron ore per day.——F. P. Jones is concentrating ore from the old dumps of the Carrasca mine. He has twenty-five men at work. These are old dumps left by the Spaniards when the mine was worked a century ago.——H. A. Mills of Colorado Springs, owner of the Wonder mine at La Belle, will put in a stamp mill at the latter-named place to work Wonder and custom ores.——Work is resumed on the O. K. mine at La Belle. A new hoisting plant will be put on the property.——The Copper Glance mine, near Elizabethtown, will be reopened this month.——The cyanide mill at Hematite has begun operations.——The Alton mill in Hell canyon cleaned up $300 from a three days' run.

ARIZONA.

Work is to be resumed on the old Blue Nose mine at Harshaw, long idle on account of low price of silver.——The Hardshell mine, near Crittenden, is said to be turning out one ton of ore every five minutes; the ore is shipped to the El Paso smelter.——The *Bulletin* says: The Arizona Copper Co. is enlarging its plant and in a short time expects to do way with all of its small steam engines and furnish power by electricity.——The Coconino *Sun* says: Work on the smelter at Williams is progressing right along. Work on the railroad to the Grand Canyon was suspended several weeks ago, and it is not known when it will be resumed.

The ore body in the United Verde copper mine at the 500 level is nearly 400 feet wide, carrying copper, gold and silver.——The ore body in the Wicks & Allison mine, near Tucson, is growing larger as development proceeds. It is said to average $50 per ton. ——Work is progressing on the London and Cullen copper mines in the Whetstones. The tunnel has reached 120 feet, tapping the ledge at 300 feet depth.——The Azurite mines, near Tucson, have 4000 tons of ore on the dump, running from 8 to 12 per cent copper and from $4 to $17 per ton in gold. The high grade ore will be shipped until the company erects a smelter.——The Monte Cristo mine at Groom creek started up the middle of April and is in good ore, both gold and silver. Hutchins & Nolan will sink the shaft 250 feet.

Near Wickenburg the Helm Bros. are operating their 100-ton cyanide plant on the tailings of the Vulture mine with success.—— The Storm Cloud mine, Yavapai county, which is being developed by Eastern capital, has a shaft down 150 feet. A bar of bullion is being produced weekly from the ore taken out in development work.——A strike of copper sulphides was made in the seventh level of the Hoosier mine, of the United Globe mines of Arizona.——Brown Bros. & Co. have opened a body of silver-gold ore in the Lone Star mine, Mineral Park.——D. F. Kendrick of Minneapolis, Pres. Swiss Belle Co., operating in Santa Maria, has let a 250-foot contract, on completion of which the company will erect a large plant to work their ores, their present mill being too small.——J. Robberts commenced work on an 18-inch ledge, which is free milling and goes $30 per ton.

The Garcia G. M. Co. of London, Limited, will put in a pumping plant and three miles of pipe line from the Hassayampa.

The shaft of the Elkhart at Chloride is down 304 feet.——The Mammoth mine, near Tucson, recently shipped an $8000 gold brick. ——The White Hills Co. shipped six 200-pound bars of bullion to San Francisco.

A 250-ton shipment of ore from the Duquesne group, near Nogales, was sent to Pittsburg, where exhaustive tests have been made upon it. The ore carries considerable copper, accompanied with sulphur and zinc, and has consequently been of such rebellious nature that work upon like properties in the neighborhood had been abandoned. It is understood that successful methods of treatment have been found and machinery is on the way from the East to be erected upon the Duquesne properties.——The Pride of the West mine is a steady shipper, and has been for fourteen years. About forty tons are shipped monthly, yielding a net return of $15 per ton.

MEXICO.

Near Jupicari, Sonora, the Esperanza Co.— a corporation from Kansas City—is about opening extensive placer grounds. The company is organized with a capital of $600,000. G. W. Bradley will be Gen. Mgr.

The following report of operations of the Batopilas M. Co. for two years, from January 5, 1896, to January 2, 1898, has been received: The ores received and treated in Haciendas San Miguel and San Antonio were as follows:

	1st class ore, lbs.	*2d class ore,* lbs.	*3d class ore,* lbs.
1897.....	553,334	800,872	21,780
1896.....	333,270	810,011	19,529

Gen'l Mgr. Shepherd says: The product from mines during period has been less than expected, while expenses of working and low price of silver have augmented the unsatisfactory condition. Preparations are being made to increase San Antonio mill to seventy-five stamps and San Miguel mill to twenty-five stamps.

The Van Anda Co., E. Blewett Mgr., which proposes to establish a smelter at Vancouver, states that a sampling plant and assay office will be attached to the smelting works. The furnace is to have a daily smelting capacity of sixty tons. The ores will be roasted in piles, to burn off the sulphur and oxidize the iron, then charged into the furnace with coke, producing a 50 to 60 per cent matte. Further treatment of the matte, to produce metallic copper, will be carried on in reverberatory furnaces. The smelter will be under the superintendence of T. Kiddie.

About one ton of antimony is extracted daily from the Pueblo mines of Pueblo, worth $125 per ton.

AUSTRALIA.

The output of the Broken Hill Proprietary Company, Ltd., for the four weeks ending March 31st, was: Ore treated, 23,915 tons, for the following refinery products, including products from ores purchased: Gold 1513 ounces fine; silver, 330,126 ounces fine; soft lead, 2199 tons; antimonial lead, 45 tons (estimated). Also copper matte, containing copper, 3 tons (estimated); and 19,770 ounces fine silver (estimated).

Alaska and Kotzebue Sound Steamers.

JOHNSON-LOCKE MERCANTILE COMPANY, Agents,

"GOLD PICK LINE,"

609 Market Street, San Francisco, Will Dispatch the Following First-Class Steamers:

May 28th, for KOTZEBUE SOUND, DUTCH HARBOR, NUNIVAK ISLAND, HOOPER'S BAY, ST. MICHAEL and DAWSON CITY, the newly built triple expansion steamer "**GRACE DOLLAR.**" Upon arrival in ST. MICHAEL passengers for DAWSON CITY will be transferred to the newly built, highly powered river boats and barges, "**RIDEOUT,**" "**GOLD STAR,**" "**PINAFORE**" and others. The "**GRACE DOLLAR**" then will proceed without delay to KOTZEBUE SOUND, where passengers will be disembarked and placed upon the river steamer "**ARCTIC BIRD**" and will be given free passage up the Putnam River as far as FORT COSMOS. The Pacific Coast and Kotzebue Sound Transportation and Trading Company will also maintain at KOTZEBUE SOUND a Warehouse. Parties contemplating a trip to KOTZEBUE SOUND are strongly advised to take passage on the "**GRACE DOLLAR.**" She has a newly built triple expansion engine for the highest power; her bows will be sheathed so as to permit her making her way through the breaking ice; and the "**GRACE DOLLAR**" without question will be the first vessel reaching KOTZEBUE SOUND this year.

May 25th, JOHNSON-LOCKE MERCANTILE COMPANY, Agents, Will dispatch for DUTCH HARBOR, NUNIVAK ISLAND, HOOPER'S BAY, ST. MICHAEL and DAWSON CITY, the Steamship "**TILLAMOOK,**" Connecting at ST. MICHAEL with the Steamers "**STAGHOUND,**" "**GAME COCK,**" "**CITY OF DAWSON,**" and other boats.

June 1st, JOHNSON-LOCKE MERCANTILE COMPANY, Agents, will dispatch for ST. MICHAEL, DAWSON CITY, and YUKON RIVER POINTS, the magnificent Steamer "**MORGAN CITY.**" Capacity 700 passengers and 2000 tons freight. The "**MORGAN CITY**" connects at ST. MICHAEL with the "**GAME COCK,**" "**STAGHOUND,**" "**POWELL,**" "**ALVISO,**" "**RIDEOUT,**" "**GOLD STAR**" and "**CLAN MACDONALD.**"

Sailings of three additional ocean steamers early in June will be announced by us within a few days. Passenger and Freight Office

JOHNSON-LOCKE MERCANTILE COMPANY, 609 Market Street, San Francisco; 112 Yessler Way, Seattle; 809 Home Insurance Building, Chicago.

Coast Industrial Notes.

—The Union Oil Co. is putting up a 35,000-barrel storage tank at Coalinga, Cal.

—The Tubbs Cordage Company announce an advance on manila to 8¾ cents, and on sisal to 7¾ cents.

—About 150 men are at work for the O. R. & N. Co., laying steel rails between Umatilla and Wallula for $1.40 a day.

—The railroads have given California stockmen half rate on cattle, and it is estimated that 50,000 head will be shipped East.

—The horse cannery at Linnton, Or., where last year 9000 horses were slaughtered and canned, will shortly resume operations.

—From $10 to $20 is being offered Truckee ranchers for this season's hay before crops are harvested. Buyers are in Carson valley, Nev., offering $10.50.

—Redwood shipments for April were 14,000 M. feet, 12,000 of which went to San Francisco and southern California; the remainder to Hawaiian Islands and Europe.

—The Western American Co. has incorporated in Seattle, Wash., capital stock $500,000, to build a railroad from a point on the Carbon river to Puget sound and operate coal mines.

—A car of beeves were recently shipped from Benton county, Or., to Victoria, B. C. The average weight was 1600 pounds. Four cents a pound was the price paid, or $64 a head.

—The Canadian government has contracted with the Boston & Alaska Transportation Co. for the delivery of 400 tons of freight and 200 troops into the Yukon district of the Northwest Territory.

—Dunsmuirs deny the reported offer by them of the tug Lorne to the United States government. American vessels are still loading coal at Departure bay and Comox, B. C., for southern points.

—The Santa Fe Railroad Co. officials give notice that commencing May 2 the working time of all shop men on the system was increased fifteen hours a week, thus increasing the payroll 37 per cent.

—Reports from Astoria, Or., show that the salmon pack this season is 25 per cent less than last year. One cannery up to April 19th, '97, packed 2100 cases, and had only packed 300 cases on the same date this year.

—Tacoma, Wash., men have bought the Duff shingle mill at Kelso and purpose erecting the largest shingle mill on the coast. They will put in two ten-block machines, besides some double-block machines.

—The Con. Electric Light Co., Victoria, B. C., is locally reported to be preparing to utilize the water power at Goldstream for the operation of the electric lighting and railway system. The work involves expenditure of $100,000.

—While the manager of the Crockett sugar refinery at Stockton, Cal., cannot get labor for the beet fields, the Volunteers of America are trying to raise $200 in that city to enable that organization to provide meals and beds for tramps.

—Baker City, Oregon, proposes to build a gravity water system using 12,700 feet of steel hydraulic pipe, 39,940 feet of wrought-iron pipes with reservoirs, gates, hydrants and full circulating water mains. The distance from Elk creek to the city is 51,940 feet and the cost would be about $135,000. It recommends putting in eleven hydrants and connecting dead ends at a cost of $9000; new boilers and buildings, $1000; boring new wells and improving system, $10,000.

—The S. P. Company has recently put on, between Dunsmuir and Red Bluff, Cal., several new compound coal-burning engines, straight stack and ten wheelers of the very latest design. These locomotives are powerful and save fuel, but cause trouble to the company in running them through the heavy tunnels in the Sacramento canyon. A local paper asserts that "the exhaust from the straight stack is so strong as to blow the lagging and rocks out of the roofs of the tunnels."

—The occupation of the Philippines by American forces will greatly augment United States exports. Trade follows the flag. In February, '98, according to the official report of the Bureau of Statistics at Washington, the United States imported from the Philippines $186,358 value of merchandise, of which $113,328 was carried in American ships and $73,030 in British vessels. American imports from the Philippines for eight months ending with February were $2,240,176 value, and our exports to the islands $69,235.

—Bakersfield, Cal., was reached by the San Joaquin Valley road this week. For the present that point will be the southern terminus of the San Joaquin Valley railway, which will be operated from there to Stockton. There will remain to be built the interval between Stockton and Point Richmond. Nearly two years will yet be occupied in building the Valley road from Bakersfield to San Francisco bay, on account of the long tunnel. Thus far nearly $4,500,000 have been expended, and about $3,000,000 more will be required, making a total of $7,500,000. To meet it are the $2,500,000 of paid-up shares and the authorized issue of $5,000,000.

—The acceptance of the American tender for 13,000 tons of steel rails by the Railway Commissioner of the Victorian railways proved a surprise for the local commercial circles there. The tenders were open to all the world, and five were sent in. Two of these were American, two English and one German. One of the American tenders (that of the Carnegie Co.) was declared informal. The other (that of the Pennsylvania Steel Co.) was successful. The amount of the tender was £75,471, or about $377,350. This was the lowest. Next came the two English tenders at £79,214 and £81,256, respectively, or a difference in favor of the American tender of £3803, which is a pretty substantial amount. As compared with the former contract let to an English firm of £5 13s per ton, the American contract works out to only £4 19s 9d per ton on exactly the same specifications. This is the first time a big railway contract has gone to America from Australia. Commenting upon the result, the Melbourne *Age* says: "The result of the tender is corroborative of statements lately published in these columns showing that under protection the United States manufacturer has not alone developed a rail trade, and driven the British railmaker completely out of the American market, but has successfully invaded the British market itself under the 'beneficent' policy of free trade, and is, moreover, successfully competing against the British manufacturer in the markets abroad, which the latter held almost exclusively for so many years."

Personal.

G. H. NIHELL is Supt. National quartz mine, Graniteville, Cal.

J. EDDY, a mine owner, Grass Valley, Cal., is in San Francisco.

D. NEAGLE, Supt. Carlotta mine, Sonora, Cal., is in San Francisco.

F. DANT succeeds N. Carmichael as Supt. Karau mine, Mariposa, Cal.

A. TRITTENBACH, Supt. Dutch mine, Jamestown, Cal., is in San Francisco.

A. W. HAWLEY, a mine owner from Grass Valley, Cal., is in San Francisco.

L. E. SMITH becomes Gen. Mgr. Prince Albert G. M. Co., Cripple Creek, Colo.

S. C. WILMANS, Supt. Boulder mine, Shingle Springs, Cal., is in San Francisco.

J. J. CRAWFORD has returned to San Francisco from a business trip to El Dorado Co.

MARCUS DALY added $15,000 to an equal amount furnished by the State for Montana's exhibit at Omaha.

D. KEITH, managing owner Silver King mine, Park City, Utah, has returned home from San Francisco.

J. A. EDWARDS of Birmingham, Ala., is examining mining property in Yuba Co., Cal., with a view to purchase.

F. J. FLETTER of San Francisco, Pres. Brunswick Con. G. M. Co., Grass Valley, Cal., is on an official visit at the mine.

W. R. CHADBOURNE, Gen. Mgr. Mikado mine, Leadville, Colo., is examining the old Lindsay mine at Maybert, Cal.

H. A. BURIS, an English oil expert, is on his way from London to investigate the petroleum fields reported discovered last year in southeastern Alaska.

A. J. REYNOLDS has returned to London after buying No. 27, Dominion creek, in the Klondike district, for a London company and making other mining deals.

JOS. MCGILLIVRAY has returned from Cariboo, B. C., and next week starts for the Klondike, heading an expedition to develop property he has acquired therein.

ELWOOD MEAD of Wyoming has been appointed consulting expert in connection with the Bureau of Irrigation, which is about to be organized under the Department of Agriculture.

PROF. GEO. DAVIDSON of San Francisco will shortly assume the position of Prof. of Geography in the College of Commerce, to which he was recently elected by the regents of the University of California, who at this week's meeting voted him an annual salary of $4000.

H. BRATNOBER is reported tramping alone in a northwesterly direction somewhere between the Dalton trail and the source of the White river in Alaska. He will not return to civilization again until September. He may appear at the mouth of the Copper river in the autumn.

AT Houghton, Mich., J. L. Cooper, thirty years in charge of the smelters of the Detroit & Lake Superior Copper Co., has been appointed superintendent of the smelting department of the Quincy M. Co. J. Case, who succeeded Mr. Cooper on May 1st, has been appointed superintendent of the Dollar Bay smelters, vice R. G. Collins, who will manage the works of the Tamarack-Osceola Copper M. Co. at Dollar Bay.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MAY 3, 1898.

603,421.—WHEELED SCRAPER—W. C. Bradford, Arbuckle, Cal.

603,260.—LUBRICATING SHAFT BEARINGS—O. F. Cook, San Jose, Cal.

603,319.—SEPARATOR AND CONCENTRATOR—Crowell & Gale, S. F.

603,425.—GOVERNOR—C. Cummings, Oakland, Cal.

603,322.—OIL STOVE—E. H. Driggs, Berkeley, Cal.

603,562.—NECK YOKE—W. E. Haight, McMinnville, Or.

603,331.—BICYCLE BRAKE—F. H. Heath, Tacoma, Wash.

603,531.—DRILLING TOOL—I. W. Mason, Aberdeen, Wash.

603,281.—BICYCLE—T. P. McDermott, Portland, Or.

603,455.—PIPE BINDER—C. L. Pinney, Los Angeles, Cal.

603,579.—STEP LADDER—O. Richardson, Clipper Gap, Cal.

603,517.—GAME COUNTER—J. Schneider, S. F.

603,392.—WOODEN PIPE—W. J. Woodward, National City, Cal.

28,540.—DESIGN FOR DOOR LATCH.—R. H. Martens, Colfax, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SEPARATOR AND CONCENTRATOR.—Charles E. Crowell, Stella, Cal., and Merritt F. Gale, San Francisco, Cal., said Gale assignor of entire interest to said Crowell. No. 603,319. Dated May 3, 1898. This invention relates to an improvement in that class of machines known as ore washers or separators, in which granular substances and minerals of different specific gravities are separated by agitating them in a current of water while enclosed in a suitable receptacle. The invention consists of one or more series of hoppers situated one below the other, so that the discharge from the uppermost will be delivered successively into the bottom of the next succeeding hopper, said hopper being of gradually increasing diameters, having upwardly diverging sides. Inclined overflow, directing lips surround the upper parts of the hoppers and discharge into annular surrounding troughs, and pipes connect these troughs successively with the bottom of the next succeeding hopper, so that an upward flow at a gradually decreasing rate takes place in each of the hoppers. In connection with these are inclined cylindrical screens, generally intermediate between one or more series of the hoppers, so as to receive the overflow from the preceding hopper and deliver it into the following one. Final discharge sluices and preliminary water and pulp receivers are employed with means for regulating the water supply and a device for diverging the supply of pulp alternately from one series of hoppers to another, so as to allow the idle one to be cleaned up.

PENDULUM ESCAPEMENTS.—F. Baginski, Allenstein, Germany, assignor to Henry H. Keeling, San Francisco, Cal. No. 603,419. Dated May 3, 1898. This invention relates to an escapement mechanism for timepieces, and other similar purposes. It consists, essentially, in the combination with an escapement wheel of the oscillatory pendulum carrier having the transverse arm fixed to and movable therewith, a pin carried by said arm is adapted to alternately engage with and disengage from the teeth of the escapement wheel, an independent weighted bell-crank arm or lever fulcrumed with relation to the escapement and pendulum, a segment having a projecting point adapted to engage with and disengage from the teeth of the escapement wheel in alteration with the movement of the first-named point, said point being connected by a link with the bell-crank lever, and is actuated by it.

WHEELED DUMPING SCRAPERS AND GRADERS. Walter C. Bradford, Arbuckle, Cal. No. 603,421. Dated May 3, 1898. The object of this invention is to provide a means whereby earth can be scraped up and the pan raised and lowered and discharged at any desired point with great facility. It consists of a bisecting pan fastened to a frame carrying a scraper or cutter at its forward end, links by which the pan is suspended, and a lever so connected as to actuate the rear portion of the pan to open or close them and a spring pressed lever by which the pan may be raised or depressed. The scraper has share or cutter in front, and the earth gathered by it is delivered into the receiving pan behind, and the pan when full may be raised and transported to any desired point by means of the wheels upon which the apparatus is mounted, after which the sections of the pan are opened away from each other so as to discharge the load.

GOVERNOR FOR AIR COMPRESSOR.—Charles Cummings, Oakland, Cal., assignor to the Pneumatic Power Co., San Francisco, Cal. No. 603,425. Dated May 3, 1898. This invention relates particularly to that class of air compressing machinery, in which two unequal pressures of air or other gas or fluid are employed both above the normal atmospheric pressure and circulating in a closed system. The present invention relates to a governing apparatus for automatically controlling the action of the air-compressing machinery. It consists essentially of a means for automatically keeping an arithmetical ratio or a constant difference of pressure between the two unequal pressures in an apparatus, in which these pressures are both above the normal atmospheric pressure and the means employed acts to vary the speed of the compressor so that it will generate more or less energy for the work to be done by the driven machine as may be required. The means employed consist of a governor which comprises connected pistons of equal pressure areas acted upon by the unequal pressures, means for counterbalancing the difference in pressure and holding the pistons in equilibrium and means operated by the connected pistons for controlling the compressor driver medium. A weighted lever is connected with and operated by the pistons to counterbalance the difference in pressure and hold the pistons in equilibrium and a valve controlling the supply pipe which leads to the motor actuating the compressor, is connected with the weighted lever and regulated by the movement of the governor pistons. A low pressure pipe leads from the low pressure conduit to the low pressure end of the governor and a high pressure pipe leads from the high pressure conduit to the high pressure end of the governor. Changing the initial pressure of air to be compressed varies the ratio of the initial to the final pressure and the efficiency of the system is thereby increased or decreased according as the initial pressure is made greater or less.

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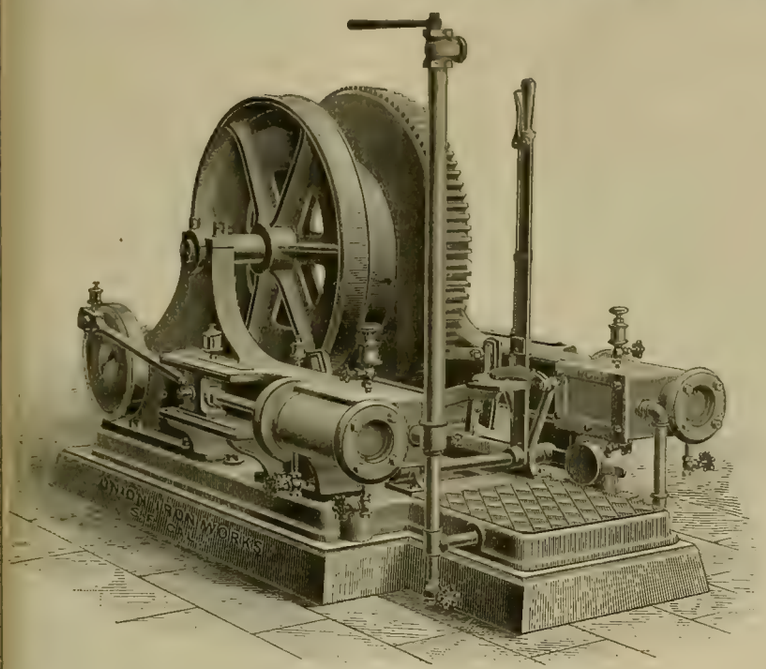
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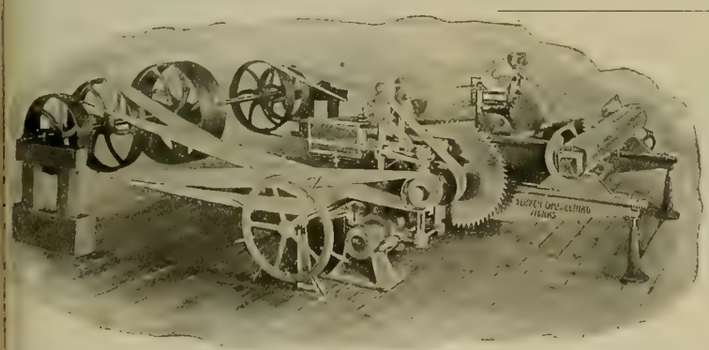
The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

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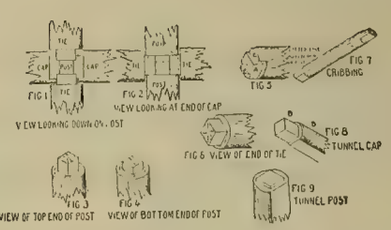
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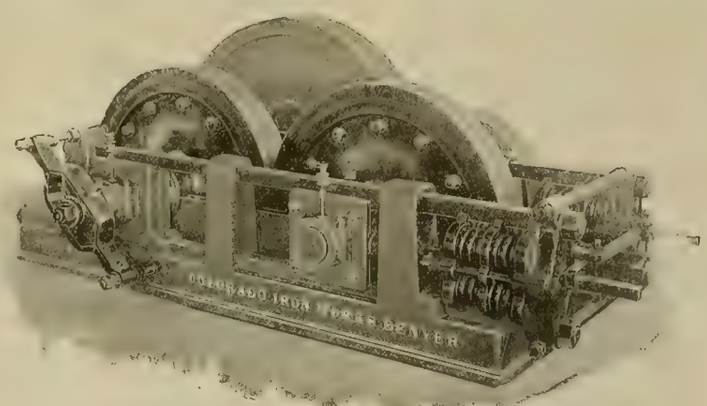
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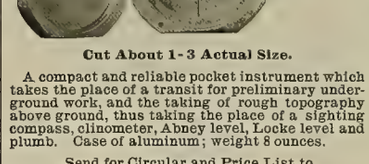
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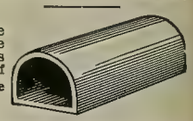
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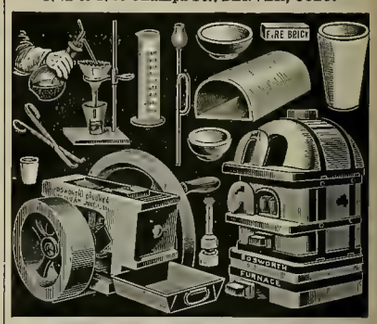
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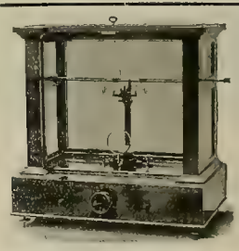


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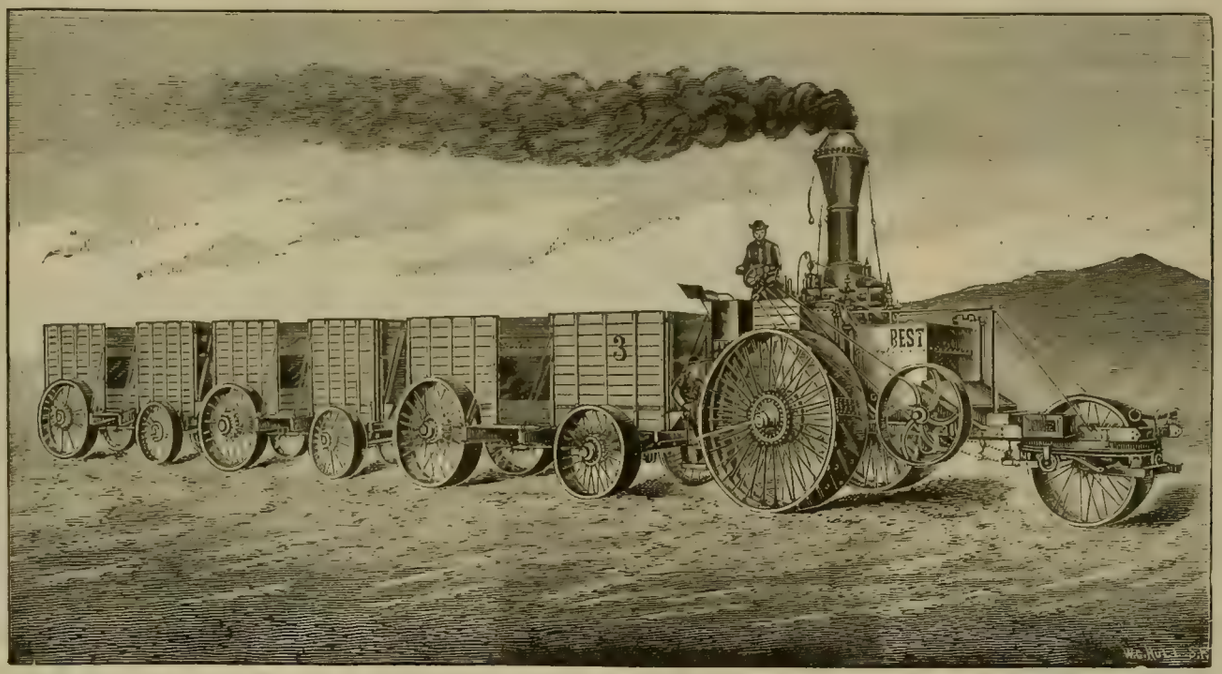
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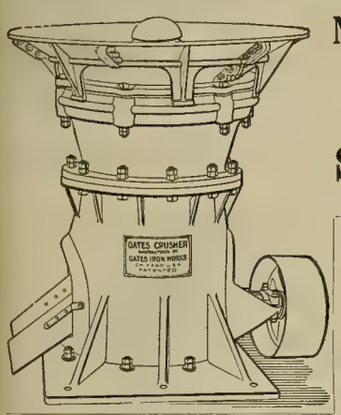
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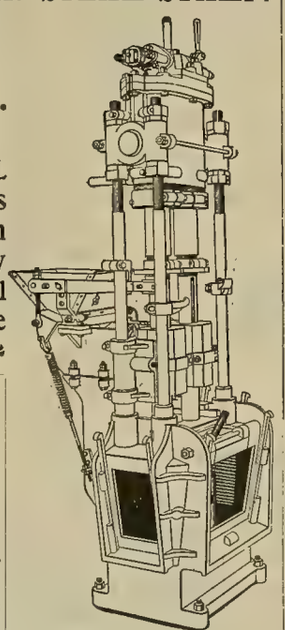


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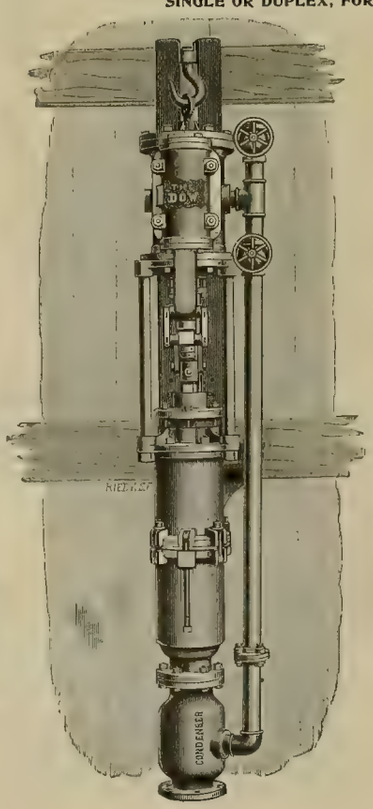
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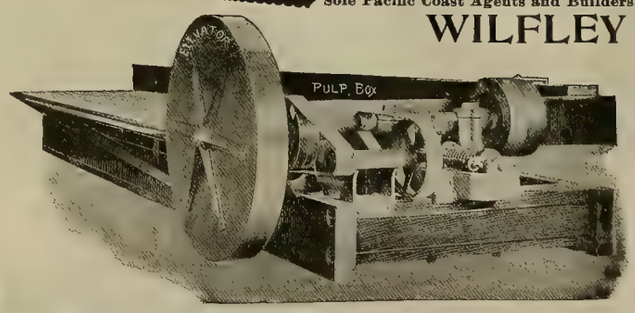
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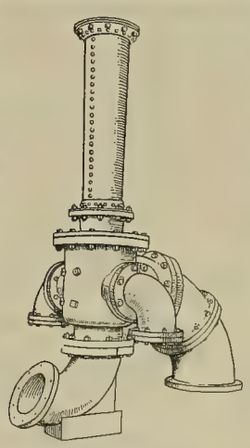
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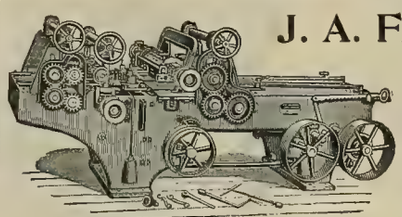
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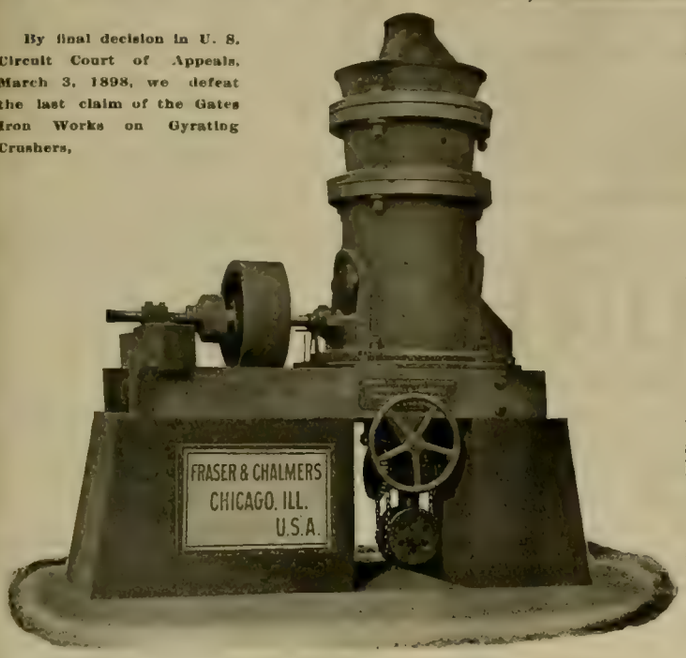
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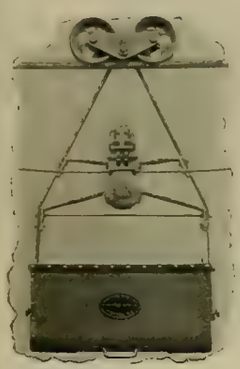
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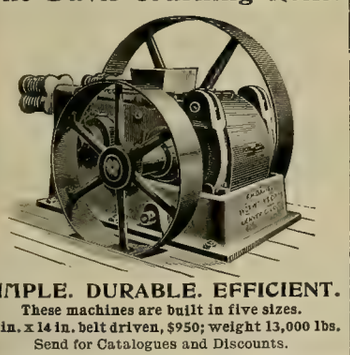
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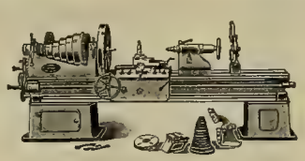
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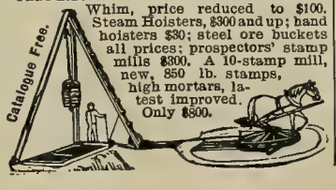
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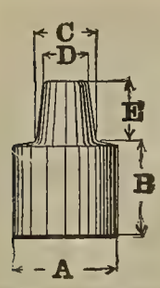
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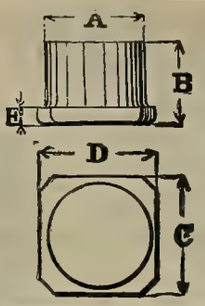
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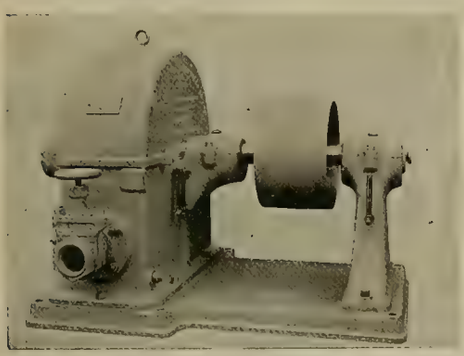
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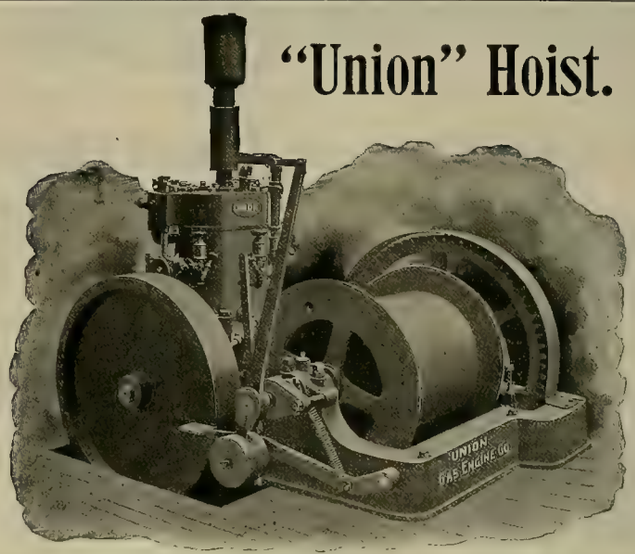
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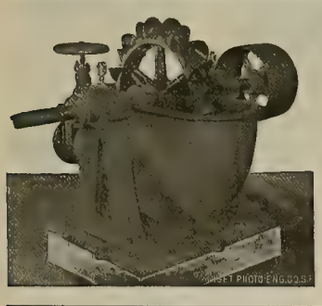
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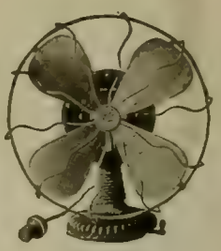
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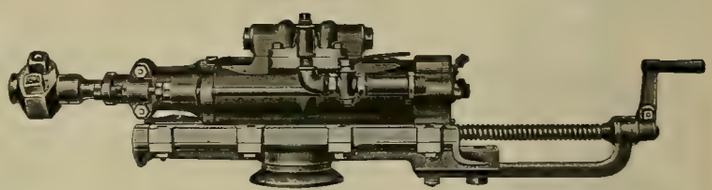
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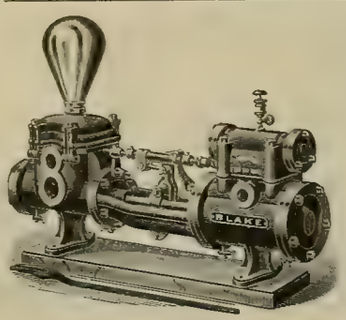
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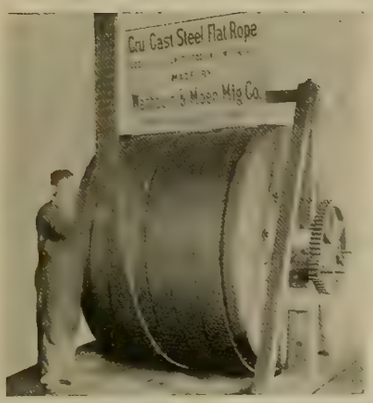
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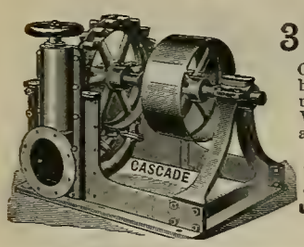
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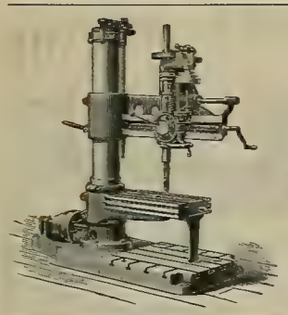
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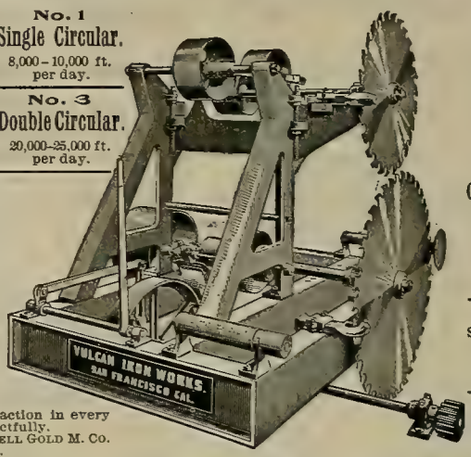
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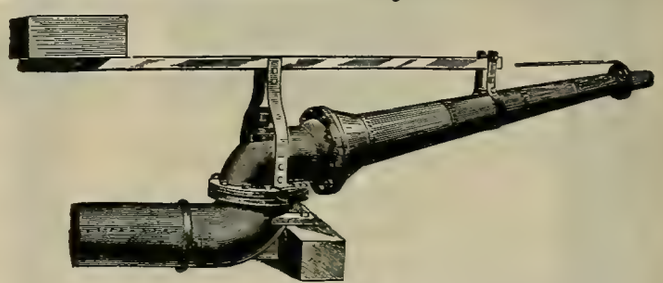
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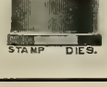
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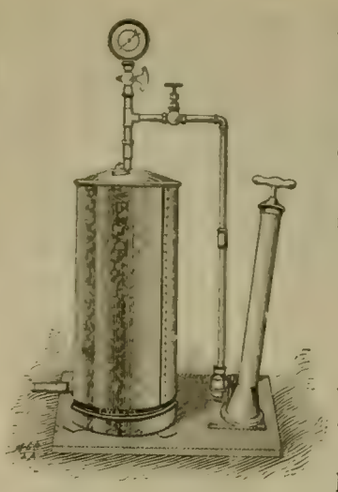
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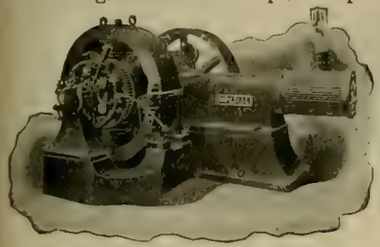
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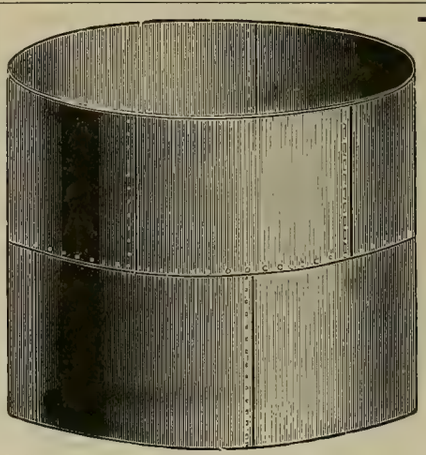
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Market Reports.

The Markets.

SAN FRANCISCO, May 12, 1898.

Never in the history of this Pacific coast since the admission of California has war been of so local a nature or effect as at present. While the victory of Dewey at Manila freed the coast from all apprehension of Spanish invasion, the occupation of the Philippines made necessary American reinforcements, and there are now massed in this city 5000 soldiers, who next week will start for our new national acquisitions in the Orient. This has had a stimulating effect on nearly every line of production. As an instance, may be mentioned that to-day the Government placed purchasing orders in this city for one million rations; this, in connection with other purchases, has materially stiffened prices and aided local business. In general it is believed that the transfer of the Philippine Islands, which is certain to follow Admiral Dewey's victory, the opening up of China largely on the British principle of the "open door," together with the development of Japan, to say nothing of the possibilities in Samoa and Hawaii, indicate that the future will see a great expansion of trade with the far East. It is reasonable to suppose that, owing to its geographical location, as well as the commercial enterprise of its merchants, this section will receive a fair share of this new business. It seems likely that new and powerful aggregations of capital will be formed to master and control this business and that the development of our merchant marine has now an opportunity that needs only intelligent and sagacious action from the national legislature to assure it an enormous success. Meanwhile, the Pacific Mail Steamship Co. is destined to profit largely.

In coal yard prices on coast coal to dealers is: Wellington, $8; Seattle, $6.50; Coos Bay, $5.50; Southfield, $7.50.

Locally, metals are unchanged. A New York dispatch says: Lake copper, $12 bid and $12.15 asked; tin, $14.40 bid and $14.50 asked; spelter steady, $4.10 bid and $4.20 asked; lead easy, $3.60 bid and $3.65 asked. No change in the quotation of lead fixed by the firm naming the setting price for Western miners and smelters, the figure still being $3.50.

Quicksilver has advanced 50c per flask. The local jobbing price is $41.50.

Silver is quoted in New York at 57, bar; local, refined, per ounce, 1000 fine, spot, 57; London, 26¼d, 925 fine.

From Feb. 25th, '98, to last Tuesday, inclusive, this country imported in gold $72,292,350. San Francisco sent to New York City $14,983,721 in gold coin during the first four months of '98.

Mining Share Market.

SAN FRANCISCO, May 12, 1898.

"Dull and steady" was the opening of the week, with increased demand on Tuesday and good buying orders, weakening on Wednesday, with slight recovery to-day. The rehearing granted by the Supreme Court advanced Hale & Norcross. War and wheat transactions have, however, overshadowed all Stock Exchange operations during the week.

Plans for Comstock drainage in line with the system originally proposed by the MINING AND SCIENTIFIC PRESS are being figured on. The idea of Supt. W. E. Sharon is to organize "The Comstock Pumping Association," the cost of draining the mines down to the 3000 level from the Imperial to the Silver Hill to be borne jointly by all of the companies interested, the total cost of which he figures would not exceed $250,000. He proposes to sink the Forman shaft, now down 2700 feet, to the 3000 level, then run a drift to tap the water in the Belcher to admit of a volume flowing into the Forman shaft sufficient for the Reidler pumps placed there to lift to the Sutro tunnel level when operated at full capacity. The lifting capacity of these pumps will be 4,000,000 gallons in twenty-four hours—twice the amount required to handle the average volume flowing into the Gold Hill mines in that time; the pumps to be operated by electric motors, the power for driving to be obtained from either the water company or by wire transmission from the Truckee river. The total cost of the project above includes sinking the Forman shaft to the 3000 level and the full equipment of pumps and drainage.

A body of high-grade ore exists on the 2700 level of the Belcher and Crown Point, which was developed just before deep mining on the Comstock was suspended.

Virginia, Nevada, reports that the Chollar and Potosi Mining Companies have ratified the contract with the Comstock Tunnel Company whereby, together with the other companies composing the Brunswick Exploration Company they are to have the use of the Sutro tunnel for deeper explorations in their ground on the Brunswick lode, besides full title to that part of the ground through which the tunnel passes. The Chollar Mining Company is to pay $5700 in back royalties to the Comstock Tunnel Company for ore extracted from the Brunswick ground. The first installment of $1000 has already been paid, and other installments of $1000 each are to be paid every following sixty days until the whole amount is paid.

At the Alta mill last Thursday was completed a trial run of 320 tons of ore by the concentration and amalgamation method from which Supt. Boyle says there will be good results. The north intermediate drift, between the 940 and 825 levels, is out 42 feet in favorable-looking vein material carrying bunches of low-grade ore. They will sink a winze below the 940 level, where no work had been done before.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 12, 1898.

9:30 A. M. SESSION.

900 Best & Belcher	30	250 Mexican	09
800 Con Cal & Va	60	700 Savage	14
150 Crown Point	11	100 Sierra Nevada	61

SECOND SESSION—2:30 P. M.

200 Mexican	08	300 Yellow Jacket	24
300 Gould & Curry	20	200 Belcher	09
300 Best & Belcher	23	100 Sierra Nevada	59
250 Con Cal & Va	60	600 Union	09
400 Chollar	30	200 Challenge	11
200 Crown Point	10		

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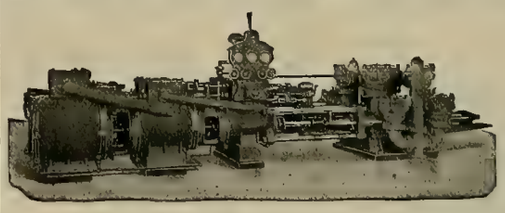
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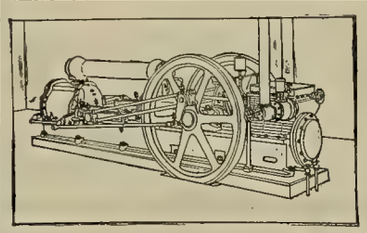
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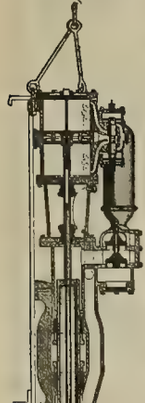
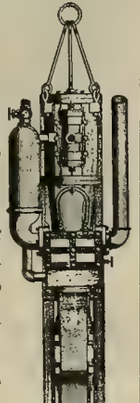
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Big Seven, Montana, $36,000; April 30.

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Crowned King, Arizona, $12,000; May 10.

Portland, Colorado, 1½ cents per share, $45,000; May 10.

Anchoria-Leland, Colorado, 1 cent per share, $6000; payable May 15.

Lillie G. M. Co., Colorado, 3 cents per share; May 3.

Hall Mines Co., B. C., 5%; May 9.

Morning Star Co., California, $6 per share; May 5.

Pennsylvania Co., California, 5 cents per share; May 5.

Bullion-Beck, Utah, 10c per share, $10,000; payable May 15.

Mercur, Utah, 18c per share, $36,000; payable May 20.

Recent California Mining Incorporations.

Gold Pan C. Co., San Francisco; capital stock, $100,000; subscribed, $70. H. Bird, H. C. Gesford, H. G. W. Dinkelspiel, H. A. Jacobs.

Excelsior Con. G. M. Co., Amador City; capital stock, $150,000, subscribed $5; J. R. Tregloan, C. L. Culbert, T. M. Church, L. L. Morse.

Alta Con. M. Co., San Francisco; capital stock, $100,000; $50 subscribed; W. B. Meckfessel, G. W. Parsons, W. F. Laumeister, A. Cook, S. K. Thornton.

Hazel G. M. Co., Chico; capital stock $900,000, all subscribed; L. A. McIntosh, J. W. Roper, J. H. Roberts, I. O. Jillison, C. B. Jillison.

El Ubarbo Con. M. Co., San Francisco; capital stock $100,000, subscribed $25; D. McKay, L. L. Rosenthal, W. Lewis, M. Loudheimer, R. Barnett.

Tuolumne Con. M. Co., San Francisco; capital stock $500,000, subscribed $500; E. A. Wiltsee, H. McAllister, S. Hoffman, J. W. Lilienthal, A. Raymond.

Alaska P. & M. Co., San Francisco; capital stock $10,800, subscribed $7920; G. Goodman, J. Loftus, J. Faubel, C. Whybron, Z. O. Fields.

Commercial Paragraphs.

THE Link-Belt Machinery Co., Chicago, have recently established a branch office at 521 Seventeenth St., Denver, Colo., Mr. A. E. Lindrooth, engineer in charge, who will look after the company's interests in Colorado and adjacent States and Territories.

THE Colorado Iron Works Co., of Denver, Colo, received an order from the Tasmanian Smelting Co., Ltd., of Zeehan, Tasmania, for two 42x120-inch silver-lead smelting furnaces, including the necessary equipment for the operation of these furnaces. This order also calls for two complete sets of extra water jackets.

THE Simonds Saw Co., San Francisco, has put into the works of the National Ice Co., at the foot of 8th St., a Marsh air compressor for hoisting the ice from the tanks, which is a great improvement over the old method of hauling up ice by hand power; also at Soquel a hydrostatic pump which forces the water a distance of one-half mile and raises it a height of 600 feet vertically. The water is used for feeding boiler for French's sawmill, located at this height above the spring.

THE contract for an electric power transmission plant for the falls of Monte Alto and Tlainepantla rivers, near the City of Mexico, has been awarded to G. & O. Braniff & Co., representatives of the Westinghouse Electric and M'f'g. Co. in Mexico, for a sum approximating $1,000,000. The plant will be the largest and most important power transmission project ever contemplated in the republic. The power will be derived from three falls in the Monte Alto and three in the Tlainepantla rivers, whose power together amounts to about 6000 H. P. This will be transmitted to the City of Mexico from twenty 800 H. P. Westinghouse polyphase generators directly coupled to twenty water wheels. The current will be sent at a potential of 22,000 volts.

Books Received.

"*Gas, Gasoline and Oil Engines:*" Second edition; pp. 384; 270 engravings; designed for general information; treats of theory and practice of gas, gasoline, and oil engines, as designed and manufactured in the United States; with chapters on horseless vehicles, electric-lighting, marine propulsion, etc. N. W. Henley & Co., 132 Nassau street, New York. Price, $2.50.

"*The Designing of Cone Pulleys:*" A non-approximate, graphical solution for the problem of proportioning cone pulleys, with concise practical rules. W. K. Palmer, Lawrence, Kansas. Price, 50 cents.

Assessment Notices.

RED CAP MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Red Cap Creek, Humboldt County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of April, 1898, an assessment (No. 3) of two dollars per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, 125 Beale St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 27th day of June, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. H. MARTIN, Secretary.

Office—125 Beale St., San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 10th day of May, 1898, an assessment (No. 1) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 218 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 5th day of July, 1898, to pay the delinquent assessment, together with the costs costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—218 Jackson St., San Francisco, California.

DELINQUENT SALE NOTICE.

TUBER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Panamint District, Inyo County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 22nd day of March, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Zerah Castle	8	6,250	3 125 00
Hugh McDonnell	17	1,000	500 00
Hugh McDonnell	18	1,000	500 00
J. W. Pew, Trustee	74	12,484	6,242 00
Nat Stein, Trustee	75	8,317½	4,158 83
Nat Stein, Trustee	76	8,317½	4,158 83
Nat Stein, Trustee	77	14,500	7,250 00
W. Sheldon, Trustee	78	12,484	6,242 00
J. W. Pew, Trustee	79	18,733	9,366 50
Nat Stein, Trustee	80	16,749	8,374 50

And in accordance with law, and an order from the Board of Directors, made on the 22nd day of March, 1898, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on THURSDAY, the 2nd day of June, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

STOCKHOLDERS' MEETING.

Notice is hereby given that the regular annual meeting of the NATIONAL CONSOLIDATED MINING COMPANY will be held at the office of the company, 916 Market Street, Rooms 56 and 57, in San Francisco, on MONDAY, the 6th day of June, 1898, at 8 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may properly come before the meeting.

By order of the Board of Directors.

G. W. FLEISSNER, Secretary.

San Francisco, May 12th, 1898.

La Sal Mountains.

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Best reached by way of the

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from CISCO or THOMPSONS stations.

Daily stage from Thompsons to Moab—here outfits can be secured at very reasonable rates—thence by wagon or saddle to LA SAL MOUNTAINS, twenty miles distant.

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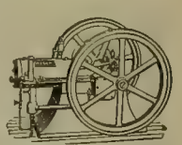
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Pat. Apr. 20, 1897; Pat. Jan. 4, 1898.

THE HEDGE GOLD EXTRACTOR, for Quartz Mill Work. A machine at last that takes the place of the apron plates in quartz mills, and will make a saving of 10 to 50 per cent over any other process. Simplicity of construction and operation. Large amalgamating surface and a complete and perfect contact. No scouring; no loss of quicksilver. Can easily be kept clean and in order. Durable, practical and economical. Built in three sizes. Price $150, $300, $400. Capacity 4, 10, 20 tons per 24 hours. Weight 175 lbs, 450 lbs, 600 lbs. PACIFIC MINING MACHINERY CO., 127 First St., S. F., Cal.



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Most of this apparatus has been removed from our own central stations to make room for larger units, and is therefore in excellent condition.

CHICAGO EDISON COMPANY, 139 Adams Street, CHICAGO, ILL.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Geo. C. Rose, in the Blue Rock Mine at Georgia Slide, El Dorado Co., to deposit tailings behind the dam of the Gold Bug Mine in Canyon Creek; from A. B. Driesbach and J. F. Dudley, in the Driesbach & Dudley Mine near North San Juan, Nevada Co., to deposit tailings in Shady Creek; from Wm. E. Moore and John Isbister, in the Fair View Mine at Sweetland, Nevada Co., to deposit tailings on a flat below the mine; and from David Cabona and John Romano, in the Imperial Mine near Sierra City, Sierra Co., to deposit tailings in old pits below the mine, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on May 16, 1898, at 1:30 P. M.



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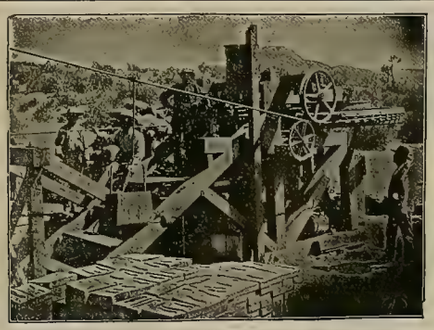
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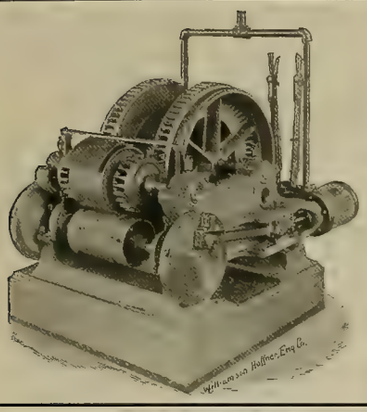
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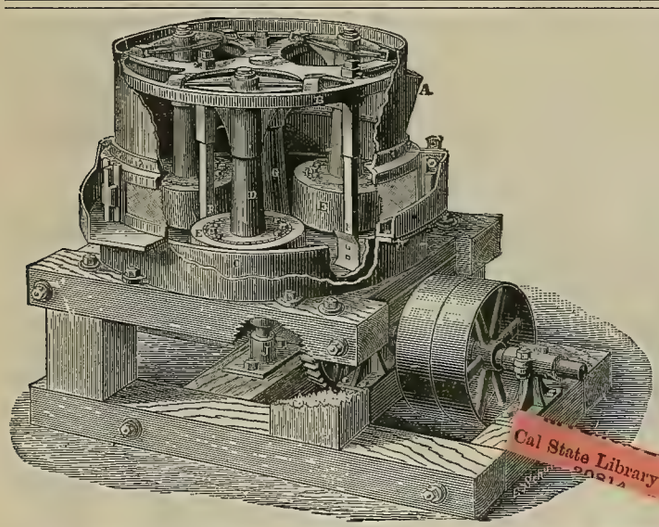
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MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with State Law.

FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1976.—VOLUME LXXVI. Number 21. SAN FRANCISCO, SATURDAY, MAY 21, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Pictures Endowed With Life.

On Saturday, May 7th, the Seventh Regiment, California Volunteers, marched past the MINING AND SCIENTIFIC PRESS office on their way to the Presidio, there to be sworn in and prepared for transportation to the Philippines with 7000 more troops to co-operate with Admiral Dewey. As they marched instantaneous photographs were taken, and on Monday, forty-eight hours after, an animated picture of the stirring scene was exhibited, thus illustrating one of the most wonderful achievements of practical science—the ability to swiftly and correctly reproduce one of the opening acts in the great drama of present war.

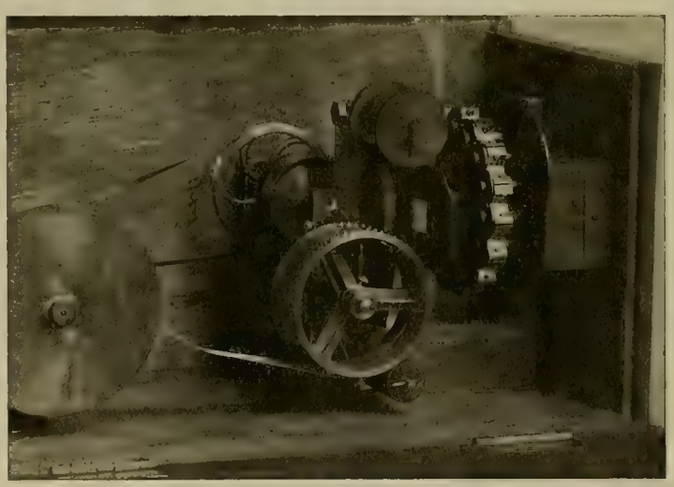


SECTION OF FILM (actual size). A squad of soldiers at drill.

As pointed out in a recent issue of Popular Science, a new and wonderful field in the realm of photography has lately been opened up to the world—a field whose extent, variety, and richness are as yet scarcely realized, though its assiduous cultivation by inventive minds has already afforded a harvest of interesting results. Aided by ingenious devices, the scientific photographers of to-day are enabled to portray motion in all its varied forms with a realism that impresses the beholder. They have, in effect, contrived to breathe life into normally changeless records of the camera; and the process is now applied, with marked success to animated scenes of the most diverse description. The busy traffic of city streets, the play of expression upon the human countenance, the movements of waves, waterfalls, fleeting clouds—these and many other effects have been depicted upon the screen with equal fidelity before audiences that have seldom failed to show their appreciation of the novel form of entertainment thus provided.

These striking productions of the photographic art will doubtless continue to attract the world's attention. They have already become a source of much instructive entertainment to the public; and their usefulness, from this point of view, must be recognized by all. But the invention has other and more serious claims upon our consideration. As a means of permanently recording and vividly illustrating notable events its importance will scarcely be overestimated. The ordinary photography can depict for us only isolated phases in the varied phenomena of life or Nature; though the value of its precise records, from the historian's standpoint, has of course received ample recognition. But the charm of animation may henceforth be added to our portrayals of historic scenes. And, in like manner, we shall be enabled to record the mutable expressions, the gestures and mannerisms, as well as the features, of distinguished men and women; while the value of all such records must increase with the lapse of time.

The subject may be regarded from two very distinct points of view. On the one hand, we are concerned with the ordinary animated pictures, whose properties and function are already known to the public; on the other, we have to deal with movements originally imperceptible to the eye, but which can be rendered visible upon a screen if the slow-moving bodies are photographed under conditions described in a subsequent part of this article. Pictures of this kind, may, for convenience, be spoken of as motion views of the second type. Such pictures have not, says J. M. Barr in the article quoted, been produced up to the present time. This aspect of the subject is interesting and merits careful investigation.



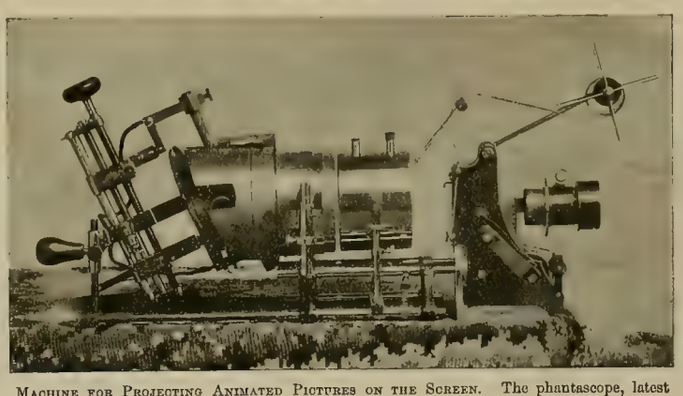
THE JENKINS CAMERA, with rotating system of lenses; capable, in sunlight, of taking one hundred pictures per second.

Although the kinetoscope and cinematograph are regarded as distinctively modern contrivances, it should be borne in mind that they represent only the recent development of a principle that has long been familiar to students of optical science. Though differing much in the details of their construction, these various machines are designed to fulfill the same general purpose—viz., the display in rapid sequence of a long series of photographs, which hence convey to the eye and brain the impression of a continuous and animated scene. In the kinetoscope the small pictures are viewed through an enlarging lens by reflected light, whereas in the cinematograph, plantascope, vitascope, etc., they are projected upon a screen—a plan that is obviously best suited to the requirements of a public exhibition.



AN APPROACHING TRAIN. Compare upper and lower views of the film.

A machine of the last-mentioned type may be shortly described as a stereopticon, combined with such mechanism as is requisite for the precise manipulation of the celluloid picture film. When the apparatus is set in motion the long band of celluloid passes quickly, though not continuously, behind the projecting lens, between spools or bobbins which revolve at [illegible] While thus passing from its original spool to the winding reel the film encounters certain pulleys and toothed rollers that serve to accurately direct its movements. Along its edges are numerous small perforations, into which the teeth of the rollers fit with precision; and by this means the small transparencies are made to occupy exactly similar posi-



MACHINE FOR PROJECTING ANIMATED PICTURES ON THE SCREEN. The phantascope, latest model, being an attachment for a J. B. Colt & Co. electric lantern.

(Continued on page 535.)

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....Publisher

San Francisco, May 21, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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DISCUSSION of water jacketed furnaces from an Australian point of view, on page 539 recalls the recent death at Antioch, Cal., of M. W. Belshaw, a pioneer California miner, who is believed to have made at Cerro Gordo, Inyo Co., Cal., the first use of water jackets on furnaces, a device now in such universal favor.

NEVADA'S greatest mine, the De Lamar, Lincoln Co., is, it is rumored, about to be bought by "a British syndicate." The De Lamar is just about what would suit English investors. It is a big property, profitable and isolated and would cost considerable. The mine was recently examined and reported on by F. W. Bradley of San Francisco. After C. M. Rolker's examination it is believed the owners refused a foreign offer of $3,000,000.

MINERS are enlisting for U. S. service. In California Maj. Andrew Myers, an old army man, is organizing a battalion in Shasta Co., and this week Capt. H. P. Gordon, another miner, who served three years in the regular army, has undertaken to raise a company. Among the 7000 volunteers arriving from coast States at San Francisco during the month are many miners and prospectors who have temporarily dropped their tools to help the Government in the present conflict with Spain.

DEWEY'S Philippine victory means much to the Pacific coast. Rightly followed up it is a commercial signal. San Francisco and coast cities have complained of geographical condition, likening themselves to "the back doors" of the nation. Why not face about, realize and grasp the opportunity, and be the front doors! The commerce of the Pacific ocean may exceed in importance that of the Atlantic. The Nicaragua canal, the acquisition of Hawaii, the Philippines, the Siberian road, the partition of China, all point the course of destiny and the future of this part of the nation, which with 6 per cent of this nation's population already has 10 per cent of the national wealth.

THE Pacific Rolling Mills, one of San Francisco's largest industries, is about to close up its extensive business and retire. The reason assigned is lack of patronage. Some millions of dollars were invested in the home enterprise, which at one time was a profitable one. The bonded indebtedness aggregates $700,000, of which $200,000 bears 6% interest, and $500,000 5%. The hope is expressed in that time all the claims will be fully paid. President Neal is inclined to ascribe the failure to "Eastern competition." Post mortems are seldom salutary, but it is in order to observe that poor management, a narrow-gauge policy, and sole reliance on local pride will wreck any business concern of any kind. It is likewise evidence of inferior business sagacity to assume that the mere existence of a manufacturing institution in a place bestows the right to claim local patronage, more especially when with that claim is coupled the right to directly compete with those from whom it asks patronage and support. The facts are not lost sight of that high prices of labor and fuel, freight rates, limited industrial area, and active business competitors all formed a formidable combination, but it is thought that proper management would have continued to make the business a profitable one, and that the inability of the directors to carry it on is no just argument against the permanent cessation of such effort on this coast.

Geological and Mineralogical Surveys in California.

For years two organizations have been at work in California having for their final object the development of the mineral industry. Both of these, the State Mining Bureau and the United States Geological Survey, have been of much benefit to the State, but it has often been recognized that this benefit could be greatly augmented if the two organizations should work in unison, following up some comprehensive and rational plan. Each has gone its own way, regardless of what the other was doing, so that investigations have been duplicated or carried out in such a manner as to be much less productive of practical good than if cordial co-operation existed.

The basis of nearly all work which belongs to institutions of this kind has long been recognized by the United States Geological Survey as lying in good maps, and it has consequently gathered a number of trained men for its topographic work. As soon as possible the maps prepared by these men are placed in the hands of the geologists, to be used as a basis for their scientific and economic investigations. The ordinary map is practically useless for geologic work, and it has been found that for some purposes the maps of the Survey on the usual scale used could be improved. Upon the whole, however, the scale employed and the details placed upon the maps have been found to represent the best that could be done.

As the Survey has to divide up its funds among the different States progress is necessarily slow in individual localities. California has been given its share, for a very extensive survey has gone on through the main gold belt for a number of years. Many of the results of this work have not yet been published.

The State Mining Bureau has aimed to more directly aid the development of the mining industry but it has labored under many disadvantages, chief among which is the lack of good maps. Neither has it had the funds nor the men trained for topographic contour mapping. Several years ago a strong effort was made and nearly succeeded in inaugurating a movement for united work between the State and National Surveys for the more rapid extension of the topographic mapping which was being carried out by the U. S. Geological Survey alone. This plan was to eventually extend the maps to the whole State, the expense to be borne jointly by the State and and general government, and the State to have the plates for printing the maps at no extra expense. This excellent plan it is hoped may yet be carried out, for if once undertaken it is certain to give such satisfaction that its completion will be assured.

The contour maps of the U. S. Geological Survey have now been extended over a large part of the central and northern Sierra Nevadas. In addition a long strip extending from Santa Monica to San Bernardino has been mapped, and smaller areas near San Diego, San Luis Obispo, and about the bay of San Francisco. Almost all of these have been made upon the scale of one mile to the inch, and have proved valuable. The State is so large, however, that many important districts under the plan which has to be followed by the Survey must be left without any study for years to come unless the State does a part of the work.

The desire has often been expressed that the maps of the main gold belt prepared by the Survey might be made on a larger scale, made to include more data of direct value to the miners, that is maps on the plan of the Nevada City sheet. This plan would, however, involve such an enormous expense that it would be practically impossible for the present at least.

Director Walcott has shown himself desirous of doing all possible for the important mining districts of the State and has undertaken, at the solicitation of the mining men of Calaveras and Amador counties, a map of the mining regions of these two counties which shall be of more practical value than those already published, using as a basis the topographic sheets and placing on them all mining claims, section corners, etc. This course has given great satisfaction and it is hoped that it can be extended.

The most important recent work of the Mining Bureau has been the preparation of a register of mines, which it hopes to make complete in every respect. This work is also good as far as it goes, and is much appreciated by all interested in mining.

Since the organization of the Mining Bureau, field work has been handicapped by the lack of suitable maps for portraying the geology and the economic features dependent upon it. All men who have had practical experience in the field, whether as miners or as geologists, recognize the fact that the work of the best of men is rendered almost useless through lack of maps. But one recent opportunity has arisen in which the Bureau has been enabled to make use of the topographical maps of the Survey, viz., at San Luis Obispo, where an area of nearly 600 square miles had been surveyed. The State Mining Bureau dropped this, however, before it was completed, and it was carried to a termination under the auspices of the U. S. Geological Survey. It will appear as a folio, being the first one completed on the Coast Range, and has given satisfaction to the people of the locality.

The State is not prepared to do the mapping that the topographic division of the U. S. Geological Survey has been carrying out. No State in the Union pretends to do much of this sort of work by itself. Because of a disinclination to co-operate with the Survey we have all along been doing economic work under great disadvantages as to time, money and accuracy.

It can be said with some assurance that any reasonable proposition in regard to co-operation between the State and the Survey would be seriously considered by Director Walcott and arrangements similar to those in other States could probably be made, particularly in regard to mapping, and if thought best possibly along other lines. Some comprehensive and rational plan once agreed upon, the work could be extended over the State much faster than by the Survey alone or by the Mining Bureau alone. Many important mining districts could be mapped in the near future which, under present conditions, would be and must be neglected for years. Under such an arrangement the Mining Bureau would then be prepared with maps upon which it could locate with as much detail to geologic and economic features as individual districts required for their full development. It is also probable that, under some joint plan, much of the main gold belt could be furnished with more detailed maps than the U. S. Geological Survey alone has prepared or would feel justified in preparing, considering its province as a national organization.

We do not counsel merging the Mining Bureau in the Survey, believing in the State doing its own work as far as possible. It is legitimate to cultivate State pride and endeavor along lines which appear feasible to do as good work as can be done anywhere, and California has men who can do such work. We ought to maintain a State Museum in which are represented thoroughly the rocks and minerals occurring within its borders. If the State attempts no geological or mineralogical investigations, but leaves that part to the Government, we would have nothing at home to represent our mineral wealth; all the collections would go to Washington, far removed from those most practically interested.

It would seem that within proper limits it would

be common sense policy to have the work of the two organizations harmonious. The State might leave to the U. S. Survey what the latter can do to best advantage, and, at the same time, through co-operation, be enabled to prepare and distribute to those interested in mining much information which under separate and conflicting work would remain unavailable. It is thought that, no matter how valuable much of the work which the Mining Bureau may plan to carry out, existing conditions make it difficult or impossible to accomplish it to good advantage; and this may be said without any reflection upon the State institution.

A systematic course of mapping, the State and the U. S. Survey working together, extending from the important centers outward, with the intention of covering finally the whole State; these maps to be used as a basis for the study of mineral deposits in detail by the State in sections where the U. S. Survey cannot spend the money, and in conjunction with the Survey in other areas resulting in more detailed work than either alone could undertake, would certainly be productive of excellent results.

This matter is worth discussion through the columns of the MINING AND SCIENTIFIC PRESS, or any other practical way, to have opinions on different sides of the question, for and against, presented, and the reason therefor given, that the feeling of mining men may take some tangible shape.

Some Questions Answered.

Three weeks ago Mariposa county, Cal., residents asked: "Is the Yosemite reservation open for prospecting and mining?" This was referred to the Commissioner of the General Land Office. Under date of May 10, he writes from Washington, D. C.:

The Act of June 4, 1897, related entirely to reservations created by proclamation under the Act of March 3, 1891 (26 Stats., 1095). Said Act of June 4, 1897, suspended the Executive orders and proclamations dated Feb. 22, 1897, empowered the President to revoke, modify or suspend any and all such Executive orders and proclamations as he shall deem best for the public service and provided "that mineral lands in any forest reservation which have been or which may be shown to be such, and subject to entry under the existing mining laws of the United States and of the rules and regulations applying thereto, shall continue to be subject to such location and entry notwithstanding any provisions herein contained."

The circular of June 30, 1897, was issued to carry into effect the provisions of June 4, 1897. The Act of Oct. 1, 1890 (20 Stats., 650), by which the lands in the Yosemite National Park were withdrawn from settlement and sale and set apart as reserved forest lands, was not repealed, modified nor in any way affected by the Act of March 3, 1891, or the Act of June 4, 1897. Therefore, the rule as to lands in said reservation still prevails that miners and prospectors can acquire no rights to mineral lands in said reservation except to perfect a claim included in a valid location which was made prior to the Act of Oct. 1, 1890, and which claim has not since been abandoned. (See Yosemite National Park, 25 L. D., 48). Very respectfully,

BINGER HERMANN.

This authoritatively answers the question in the negative.

The question simultaneously received from Idaho, Colorado, California and Utah: "Are prospecting and mining permitted within Government forest reserves?" is best answered by quoting in full the Act of June 4, 1897, referred to above in Commissioner Hermann's letter:

The Secretary of the Interior may permit, under regulations to be prescribed by him, the use of timber and stone found upon such reservations, free of charge, by bona fide settlers, miners, residents and prospectors for minerals, firewood, fencing, buildings, mining, prospecting and other domestic purposes, as may be needed by such persons for such purposes.

Nor shall anything herein prohibit any person entering upon such forest reservations for all proper and lawful purposes, including that of prospecting, locating and developing the mineral resources thereof; *provided*, that such persons comply with the rules and regulations covering such forest regulations.

All waters on such reservations may be used for domestic, mining, milling or irrigation purposes, under the laws of the States wherein such forest reservations are situated, or under the laws of the United States and the rules and regulations established thereunder.

Upon the recommendation of the Secretary of the Interior, with the approval of the President, after sixty days' notice thereof in the State or Territory wherein any forest reservation is situated, and near the said reservation, which after due examination by personal inspection of a competent person appointed for that purpose by the Secretary of the Interior, shall be found better adapted for mining or agricultural purposes than for forest usage, may be restored to the public domain. And any mineral lands in any forest reservation which have been or which may be shown to be such and subject to entry under the existing mining laws of the United States and the rules and regulations applying thereto, shall continue to be subject to such location and entry, notwithstanding any provisions herein contained.

On June 30, 1897, the Secretary of the Interior issued rules and regulations in conformity with the foregoing, authorizing and permitting the removal of timber, as prescribed in the first section above quoted.

Gypsum is a "mineral," under the mining law, and can be located in the same general manner as a placer claim—20 acres.

Pictures Endowed With Life.

(*Continued from page 533.*)

tions when their images are projected upon the canvas. As each picture in its turn attains this critical position, it is momentarily brought to a standstill. At the same time a shutter* is opened and an image of the picture flashes for an instant upon the screen. The shutter is then quickly closed, the picture resuming its motion, while its successor in the series is brought into a similar fixed position.

This temporary stoppage of the film (or of a portion thereof), as each picture attains its proper place behind the projecting lens, is a very essential feature of the process. Let us assume that a picture has arrived at the fixed position already referred to. At the instant of its arrival, a portion of the film on the preceding side of the picture will be in an unstrained or slack position. The "slack" is then taken up by a continuously moving sprocket pulley, whereupon a rod or roller is quickly brought to bear against the now tightened film, pressing it to one side and as quickly releasing it. By this movement the next picture is pulled into its fixed position, while the film is made taut (or nearly so) on the following side of this picture. These operations are repeated continuously until the entire film has passed through the holding device in rear of the lens. The process may be compared, in a general way, with the automatic feeding of a web of paper to an ordinary printing press.

A specially constructed camera is used in taking the negatives from which ultimately motion pictures are obtained. The picture roll is replaced by a reel of sensitized film, upon which the exposures are made in quick succession when the apparatus is set in motion. From twenty-five to fifty photographs are thus "laid on" in a second of time. The films range in length from fifty to two hundred feet, and contain when finished from eight hundred to more than three thousand tiny negatives. After exposure the film is subjected to the usual photographic operations. These are, however, conducted with special arrangements, rendered necessary by the inordinate length of the film. The latter is subsequently made to pass, in contact with a second sensitized film beneath an incandescent lamp, whereby the photographs are impressed or "printed" upon the sensitive surface. This second film in its turn is passed through the various photographic processes. When complete, it is wound upon a spool, and is then ready to be placed in the cinematograph or other machine used in exhibiting the pictures. Here, as already stated, the mechanical arrangements correspond to those employed in taking the negatives. Thus the pictures when displayed before an audience, are seen to flash out in the same rapid sequence in which the original scenes were presented to the "eye of the camera."

A homely illustration may aid the reader in arriving at a perfectly clear comprehension of the subject. Let us take the case of a man who is slowly walking past a high picket fence and gazing intently at some moving object on the other side of the fence. His view will be interrupted at regular intervals by the pickets as they successively encounter his sight. But if he proceed more quickly a seemingly continuous view of the object in question will be obtained, though rapid alterations in its brightness will be manifested. These effects are due to a well-known cause, viz., the persistence of luminous impressions upon the human retina. Thus, our observer's eye retains for a brief period its impressions of each momentary glimpse that is afforded him under the conditions just described; and the successive visual images become merged into one another, while the rapid fading of these retinal impressions gives rise to the pulsating effect that is familiar to everybody.

The well-known optical phenomena described are closely analogous to those exhibited by the animated pictures. In the former case we have to deal with a moving body; in the latter, with photographs of such bodies; and since the momentary images in the first-mentioned case are practically changeless it is evident that a similar general effect must be produced upon the organ of vision.

We have hitherto been concerned with motion pictures of the ordinary type—those, namely, which reproduce with accuracy the movements of the original scenes. In order to secure this result it is essential that our pictures be "taken" and exhibited at the same rate per unit of time. Where this condition has not been fulfilled, it is manifest that the pictured objects must appear to move either quicker or more slowly than their originals. If the difference in rate be small, its results will hardly be noticeable; if large, a curious but awkward and unnatural effect will be produced. Suppose the mechanism of our camera to be altered in such wise that successive exposures may be made at relatively long intervals of time, while the duration of each exposure can be varied at will. With this end in view the camera should be provided with clockwork capable of running for twenty-four hours continuously. Thus equipped we should be ready to experiment on objects—such as growing plants—whose changes are of too gradual a nature to be perceived by the eye.

If, for example, our pictures were taken at half-hourly intervals and shown at a speed of fifty per second, the apparent rate of growth of the plant would be increased no less than ninety thousand times. A slower rate would evidently correspond to a diminished time interval between successive negatives; and this interval should in all cases be so chosen as to insure gradual (though distinctly perceptible) changes in the resulting pictures.

Such views could not fail to produce an effect at once marvelous, unique, and instructive. As pictured upon the canvas, the plants would grow and develop before the eyes of the onlookers, throwing out leaf upon leaf, and visibly increasing their dimensions. Here and there a flower or flower cluster might make its appearance, the individual blossoms bursting forth suddenly and remaining visible for a brief period only. The process is clearly applicable to greenhouse or indoor plants of every description, from stately palms or tree ferns down to the most delicate mosses or lichens. Thus, the general phenomena of plant growth may be illustrated with a vividness never before realized.

In dealing with subjects of this nature we must take into account the inevitable deterioration of the sensitive films through lapse of time. It will become necessary, in fact, to use shorter films whenever the negative series is much prolonged. Such films could be treated separately, and afterward joined together so as to form one long strip—a procedure involving only a little care and the use of some celluloid solution. From this composite negative film a single uniform roll of pictures would ultimately be obtained by the usual process.

The application of this method to outdoor objects will in general be greatly restricted, owing in part to the variable light and partly also to the influence of wind and weather. Some picturesque effects could, however, be obtained by photographing natural scenery under varying angles of illumination—especially in mountainous regions and near the time of sunrise or sunset, when the most striking changes would be manifested. Seasonal variations, too, might be illustrated by depicting scenery in a forest from day to day for months in succession.

Turning from the earth to the heavens, we shall see that similar methods are applicable to the most prominent of celestial bodies, viz: the sun. The photographic art has long since been applied with conspicuous success to the glowing solar disk, with its dark spots and brighter patches or "faculæ"; and such photographs are now taken from day to day at leading observatories in various parts of the globe. During recent years, moreover, astronomers have contrived to photograph, under conditions, the surroundings of the great luminary—including the chromosphere and prominences, but excepting the corona, which can not as yet be studied in the absence of an eclipse.

The realism of our motion pictures may also be enhanced by imparting to them the quality of relief, as in the stereoscope. We may utilize for this purpose as the lantern stereoscope, whereby stero views can be shown upon a screen, the pictures being viewed through instruments resembling opera glasses in external appearances. It will be possible in this way to exhibit animated views of every description in distinct stereoscopic relief. Each member of the audience must, of course, be provided with one of the binocular instruments referred to; and it is almost needless to add that the projecting machine, as also the camera used in taking the stereo negatives, must be of duplicate construction.

The phonograph, or grapohone, has frequently been used in combination with machines for the production of motion views. By such means Edison hoped to reproduce the sounds accompanying many scenes with such perfection that it would be possible to represent, for example, the complete performance of a drama with all its accessories. Up to the present time, however, these anticipations have not been realized.

*In some forms of apparatus, such as the vitascope and phantascope, the shutter is omitted. The intermittent motion of the film does not seem to mar the continuity of the pictures, which are also more fully illuminated in the absence of a shutter.

Copper Mining in California.

The great profit in present production of copper has directed renewed attention to the copper properties of California, several of which have been described in these columns. The leading copper property is that of the Mountain Copper Co. at Keswick, Cal., which in '97 produced 13,129 tons. Near Kennett, in the same county, the Mammoth has also a good copper belt. At Spenceville, in Nevada Co., as noted in last week's issue, are important copper deposits.

In Calaveras Co. the old and well-known Copperopolis properties are not in present operation. Supt. G. McM. Ross of the Union and Keystone contemplates resumption as soon as pending arrangements are completed.

Capt. H. A. Brainard of San Jose, Cal., who recently visited the Copperopolis properties, thus describes them:

"The copper ores are found in slate rock and consist of copper sulphides or pyrites mixed with iron sulphides. The mines have been worked a depth of 600 feet, but the ore which first attracted attention lay quite near the surface and was so rich that it could be shipped to the copper refiners without treatment.

"The ores as they come from the mine are divided into two classes, the high and the low-grade ores, the former going direct to the smelting furnace and the latter being either concentrated or treated in another way.

"To concentrate the ores they are broken into small pieces in a breaker, and by treatment in water the rich sulphides are separated from the worthless slate and the mass to be treated greatly reduced in bulk.

"The lower grades of the ore are first roasted, which is done by first placing a layer of wood and brush on specially prepared ground and depositing the ore from the mines on this until many thousands of tons have thus been piled. Then the fuel is lighted and begins to burn, and when a certain heat has been attained the sulphur in the ore also burns and makes additional heat. For the low-grade ores the plan is to burn slowly and at a low heat, not alone driving off the sulphur, but changing it first into sulphurous acid, and a part of it still further changed into sulphuric acid, and the sulphide of copper into a sulphate, while the iron is oxidized. After the ore is thus roasted it is placed upon the leaching ground, which is prepared by grading and covering with boards and canvas covered with asphaltum, with a series of flumes or troughs along the lower edge.

"At the leaching ground of the Union copper mine we saw a pile of 45,000 tons of this roasted copper ore. To the top of this great pile water is conducted which dissolves the sulphate of copper as it is formed, and as this process is continually going on, the leaching of this pile of ore may go on for years and years, with no apparent diminution of the amaunt of copper sulphate, or bluestone which is thus obtained in solution. This solution is conducted to great vats, from which it is drawn for further treatment.

"This treatment consists of filling long troughs or flumes with thin scraps of iron, vast quantities of tinned iron which remain after the manufacture of fruit cans being used for this purpose. Carloads of this material are furnished from San Jose. Through these flumes of scrap iron the copper solution slowly and steadily flows, and as soon as it touches the iron a remarkable chemical change takes place. The sulphuric acid of the solution passes to the iron and unites with it, making iron sulphate which at once dissolves in the water and passes away, while the copper in a metallic state is deposited in the place of the iron which is dissolved away. Soon the iron is all gone, and in its place the precipitated copper. By continued raking and stirring these flumes, the copper is obtained in the form of a very fine powder and is known at the works as 'copper cement.' When this is dried and screened it is placed in double sacks and sold, being used as a paint on the bottoms of ships to prevent their becoming foul with vegetable or low animal growths. Copper nails must be used in the construction of these flumes, and all structures coming in contact with the copper solution, as iron ones would be speedily destroyed.

"The higher grade of the ore is placed in piles and roasted the same as the other, except that in this case the fires are allowed to become hotter, and the sulphur instead of being changed or prepared to be changed into sulphuric acid, is driven away, and the iron highly oxidized. The ore thus roasted is placed in the furnace, and if it does not contain sufficient silicious matter to properly flux the iron oxide, some quartz rock and some limestone are added, but Mr. Ross has generally been able to select his ores and to so proportion them that no additional material is required. Coke is used as a fuel, and, as the mass melts, it is drawn off into settling basins formed of firebrick, when the melted copper sulphide goes to the bottom, and the fluxed iron oxide rises to the top, and each is drawn into proper receptacles, the iron slag being dumped like melted lava on the slag pile, when it becomes a solid mass, while the copper, now called 'copper matte,' is cooled and crushed, placed in coarse sacks and sent to the copper refiner. This matte contains about 50 per cent of copper, while the ore as it comes from the mines contains only from 10 to 12 per cent. We saw a pile of 5000 tons of copper ore, all piled for roasting, and the samples showed that it contained 11 per cent of copper."

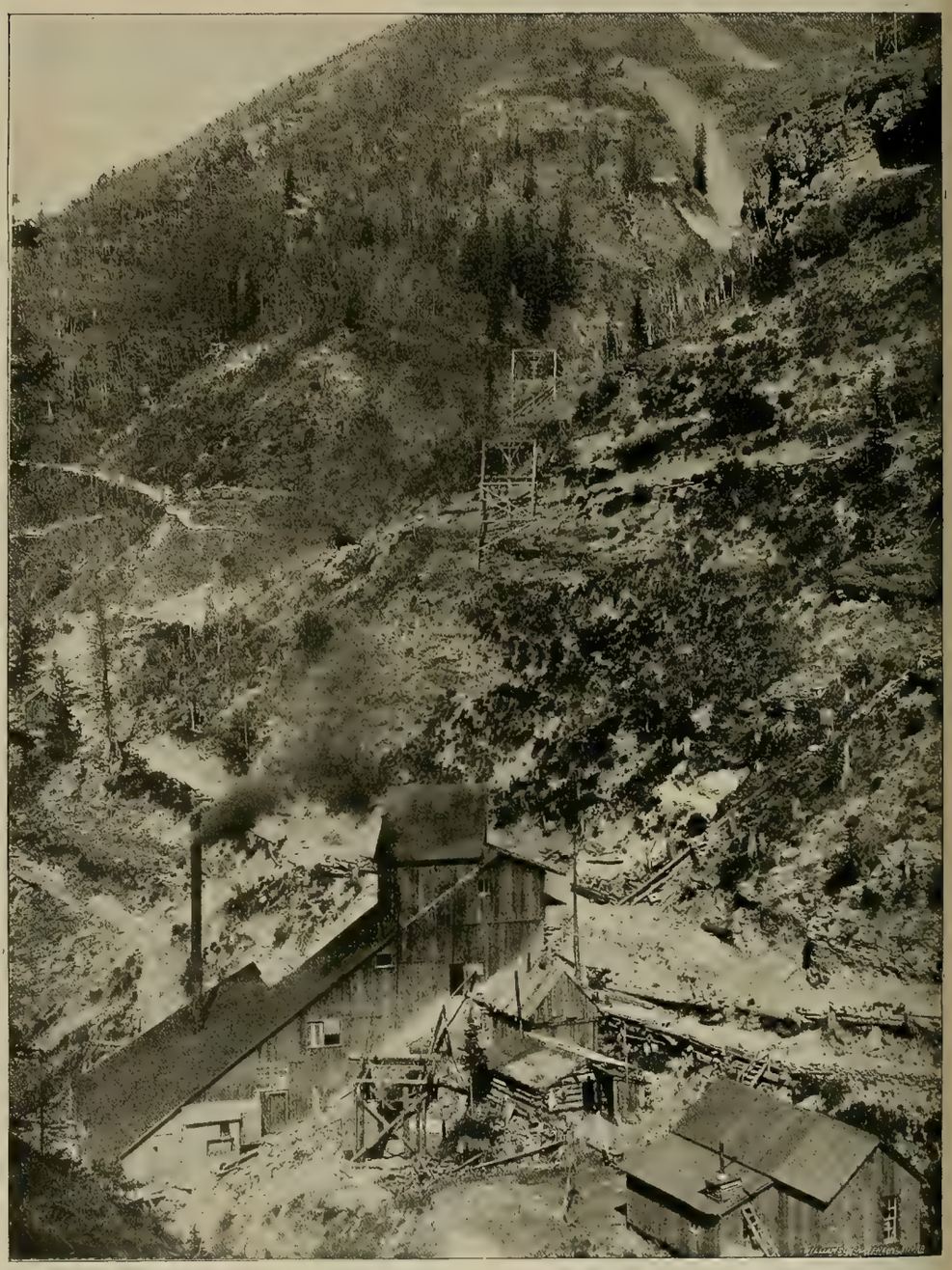
In southern California, between Daggett and Randsburg, in San Bernardino county, the *Journal of Commerce* reports that some copper deposits have been acquired by Eastern men who have begun development work. They are owned by the Pacific Copper Alliance of New York and the United Yucca Copper Mining Company, while a third corporation is being organized in Boston to co-operate. The deposit is a belt two miles broad by twenty-eight long, in which have been located 133 claims. The ore runs, on an average, 17 per cent copper, with $11 in gold and $13 in silver to the ton. The companies are credited with intention to build a 100 ton smelter for the reduction of the ores.

Development has begun very recently upon a number of promising copper properties in San Bernardino county which are owned by people who have not sufficient capital to give them proper showing. Near Manvel, and also near Vanderbilt, are several claims which are reported rich.

In connection with this subject, D. Houston & Co. of N. Y. City write: Europe keeps up a constant demand for copper, where consumption goes on at an enormous rate, and this country is expected to supply the great bulk of what is needed. As an article of commerce copper ranks of great importance. Exports of this metal from the United States during the past two years amounted in value to more than $62,000,000, and yet the trade is carried on with the smallest reserve of foreign stocks known. With European visible copper supplies reduced to the equivalent of only a few weeks' requirements at the most, the urgency of frequent and heavy shipments from this country is palpable. The consumption of copper in England and France for the first three months of this year is estimated at 67,238,080 pounds, and that of Germany for the first two months at 21,963,200 pounds. This is at the rate of fully 400,000,000 pounds consumption per annum for the three countries named. Such a tremendous European demand, in conjunction with the growing domestic consumption, indicates the degree of pressure that will fall upon American copper mines to furnish an output partially adequate to meet the gigantic transatlantic requirements, in addition to the home demand.

The Valley View Mill, Colo.

The Valley View, near the Smuggler-Union properties in Marshall basin, near Telluride, Colo., is locally reported to be among the best paying gold propositions, to the extent it is worked, in the district. A year ago the 10-stamp mill on Marshall creek was connected with the mines by a two-bucket, aerial, gravity tramway, 2007 feet in length, said to be the most automatic in operation of any tramway in the county, the labor and attention of only one man being required to operate it. The mill treats twenty-five tons of free-milling gold ore daily. The pay streak of the lead varies from 10 inches to 5 feet in width and runs from $15 to $20 per ton.



VALLEY VIEW MILL, COLORADO.
Near the top of the picture the white dumps of the mill show plainly.

LESSEES have developed many prospects into mines. A live lessee is better than a dead ownership. One brings profit, the other loss. The lessee at his own expense finds out if you have a mine or only a hole in the ground. You can afford to be lib-

eral with the man who gives you this information.—Colorado Springs, Colo., Telegraph.

Montana's Mineral Output.

From E. B. Braden, in charge of the Helena, Montana, assay office, are received advance sheets of his report of the mineral output of that State. He says:

The precious metal output of Montana during 1897 was the largest in the history of the State, and aggregated $53,954,675.03. This is $3,222,576.90 more than that of the preceding year. The total production was contained in the four metals, gold, silver, copper and lead. The quantities and values of each are shown for these two years in the table below:

Metals.	Customary measures.	1896. Quantity.	Value.
Gold	Fine ounces	211,914.961	$ 4,380,671.00
Silver	Fine ounces	15,720,022.44	*20,324,877.49
Copper	Fine pounds	232,096,483	25,356,540.77
Lead	Fine pounds	22,521,340	670,009.87
Total			$50,732,099.13

Metals.	Customary measures.	1897. Quantity.	Value.
Gold	Fine ounces	217,514.846	$ 4,496,430.92
Silver	Fine ounces	16,307,346.00	*21,730,710.03
Copper	Fine pounds	237,158,540	26,798,915.02
Lead	Fine pounds	25,704,974	928,619.06
Total			$53,954,675.03

*Coinage value.

The mountains and streams of Montana have yielded $750,000,000 of precious metals to the wealth of the world since the advent of those pioneers whose arrival was almost coincident with the discovery of gold in 1862.

In Montana gold is obtained either from the auriferous gravels of placer mines or from veins or lodes and by one of the following methods:

By smelting ore from the veins or lodes.

By milling, amalgamation and concentration, together with cyaniding of quartz ores.

By placer, hydraulic mining or dredging of gravels.

The smelting products from lodes and veins comprised those generally classed as copper, lead and dry ores. The gold derived from this source was 107,967.374 fine ounces, or $2,231,883.72, equivalent to 49.64 per cent of the entire gold yield of the State. The gain for 1897 in this class of ore amounted to 11,146 958 fine ounces, or $230,428.11.

During 1897 there was a decrease of 6695.044 fine ounces, or $138,398.33, in the production of mill bullion over that of the previous year. The proportion obtained by mills to the total yield of gold in the State was 35 per cent. This decrease has a partial explanation in the fact that the mills of the Montana Mining Co., Limited (Drum Lummon mine), at Marysville, were idle until May 1st, pending exploration of ore bodies in the mine. As the figures include the product from cyanide plants, there was still a small decrease beyond that explained in the shutting down of the Montana Co.'s mills. The output of this company from their cyanide plant during the later part of the season in a measure also affects the decreased output from their gold mills.

The extraction of refractory gold and silver values from tailings and ores by the "cyanide process" was undertaken in Montana last year on a large scale. As the cost is small, it will be adopted widely among many properties in which the ores have not been susceptible of treatment by the former and more expensive methods. A general introduction of this process will acquaint men with its methods and largely increase the production of precious metals. The amounts recovered from tailings and ores by cyanide during the year were 9993.117 fine ounces of gold and 33,937.50 fine ounces of silver, valued at $206,576.06 and $43,878.79 (coinage value), respectively. In this process cyanide of potassium is employed in dilute solution as a solvent for the gold and silver contained in the material under treatment. The values are then precipitated preparatory to refining.

The output of gold from placers during 1897 was 33,418.923 fine ounces, or $690,830.43. The increase over 1896 was a small one. The year 1896 had been a favorable one for placer mining, but the miners report 1897 to have been a "short season for water." This was due to the quick and early melting of the mountain snows, and to a scarcity of spring rains. It was expected, therefore, that the figures for 1897 would show a decreased output from the placers as compared with those of the previous year. However, the introduction and successful operation of machines, or dredges, effected an increase and inaugurated a new era in the history of Montana placer mining.

Since Marshall's discovery of gold in 1848, the profitable working of auriferous gravel has been accomplished only under the most favorable conditions, principal among which have been water and a fall in the ground attacked to permit of the disposal of the debris after sluicing. The ground included in river beds and streams, in numerous gulches where sufficient water was not available, and in large and comparatively level areas in valleys and gulches, comprise a large proportion of the auriferous deposits, and have baffled all past attempts to work profitably. Many of these gravels have been thoroughly prospected and are known to contain gold in paying quantities. It is to these conditions that miner, inventor and investor of late years have turned their attention in hope of finding some method to recover this gold. The present dredges have been the outcome, and, while they may not be adapted to all conditions, it is believed that they may be modified to meet many of the requirements now existing. These machines handle the gravel preparatory to a washing in sluice boxes with a minimum of water. They are of two types and are designated as floating and traction. These dredges have been successfully operated in Beaverhead, Deer Lodge and Madison counties.

The increase of more than a million ounces in the output of silver is wholly attributable to copper mining in Silver Bow county, where about two-thirds of the entire yield of silver occurs as a "by-product." By this term it is meant that the metal is not present in sufficient quantities to make mining and reduction profitable, were it the sole product. The silver, as well as the gold "by-product," is of great value and is an appreciable gain in the marketable output from these mines. The increased production of these copper ores during the year, some of which carried higher values in silver to the ton, explains this increase.

Silver mining, as an industry in Montana, continues to decrease in importance. With the exception of the silver properties at Elkhorn, Castle and Neihart, and the Hope mine at Philipsburg, all of the famous silver producing mines of former years are idle. However, negotiations are reported between the companies interested looking to a consolidation of the Granite Mountain and the Bi-Metallic mines at Philipsburg into one corporation. Owing to the low price of silver, the operation of these properties under separate managements has been found unprofitable. The object, therefore, will be to minimize the cost of separate management, office hire and superintendence, as well as milling and mining, by consolidation into one company, and thus enable a profit to be realized. If effected, this will add materially to the future yield of silver, as the ore bodies are extensive and the past production of this metal has been enormous. The resumption of these mines will be watched with eagerness by the owners of silver properties, and, if profitable, may encourage consolidation and economical management in other instances that will be beneficial to the industry.

Montana produced 237,158,540 fine pounds of copper in 1897, which is equivalent to 50.22 per cent of the entire output of 472,225,600 fine pounds by the United States last year. Copper mining is, therefore, the most important branch of the precious metal production in Montana. Almost the entire product is from the Butte district, which has produced $383,086,779.07 in gold, silver, copper and lead during the last fifteen years. This exceeds that of any other locality of a like area in the world during the same period.

While lead mining in Montana has been the least important branch in the mining industry, the increase made during 1897 is proportionally greater than that shown in any other. To appreciate this, it is necessary to consider the closing down early in the year of the Iron mountain mine in Missoula county. This property was then the largest lead producer in Montana. The improvement made in the production of Meagher, Broadwater, Flathead and Cascade counties is therefore greater than would appear in the comparison of aggregates for the entire State. The gold and silver occurring as a "by-product" also adds a large amount to the output of lead mines and should be considered in an estimate of the actual advance made in this branch.

It will require the construction of many additional plants for the treatment of gold ores to admit of the development of gold mining in Nevada State to the old volume of silver mining. Considerable is being done in that direction and the gold output is increasing, which compensates for the decline of stock mining.

A Calaveras Co., Cal., "Prospect."*

At the South Paloma prospect an old tunnel was driven many years ago into the hillside. Ore was obtained, but not in sufficient quantities, and of too low grade a character to pay at that period. When the present company took hold of it in 1895, very little work had been done except this prospect tunnel. It is fair to state that unless the Gwin had successfully reopened, the shaft would never have been sunk on the South Paloma. With systematic development the company has carried the prospect shaft 700 feet in depth, and is drifting at that level. The South Paloma prospecting plant is very complete and economical, and consists of a steam 35 H. P. hoist, shop and outbuildings, representing the first step toward the making of a great mine. The shaft is 5x7 in the clear and timbered every 5 feet with 12x12 Oregon pine timbers. The gallows frame is 35 feet high, also of 12x12 timbers. The hoist has a capacity of 1200 feet. About $26,000 has been expended in equipping and sinking the mine to the 700 foot level and drifting at two levels. In this class of work the main expense is in the shaft sinking; but when once the shaft is sunk and drifts run on the ore, the profits can be calculated with as much regularity as the interest upon 6 per cent bonds. The cost of the shaft sinking depends upon the size of the excavation, nature of the country rock through which the shaft is sunk and the amount of water encountered. The shaft at the South Paloma prospect was sunk at an extremely low figure, all the conditions being favorable. Comparatively small quanti-



QUARTZ VEIN OF THE FOOT & THOMPSON MINE, EAST BELT, CALAVERAS CO., CAL.



HOISTING PLANT SOUTH PALOMA MINE, CALAVERAS CO., CAL.

*Mining Resources Calaveras Co.

ties of water were encountered in sinking and the slate was easy to break.

A detailed average cost of sinking per foot is presented as follows, taken from the superintendent's record:

	Per foot.
Labor	$ 8 00
Lights	15
Powder	50
Management	2 00
Top labor	2 35
Timbering	2 00
Total per sinking foot	$15 00

Cyanide, Chlorination and Amalgamation in Colorado.*

R. B. TURNER.

Cyanide.—The Cripple Creek district has been one of the best in the State for the treatment of its ores by the cyanide process, and has five mills: The Colorado Ore Reduction Co., Elkton, chlorination 50 tons, cyanide 60 tons per day; the Brodie Gold Reduction Co., Mound City, cyanide, 100 tons per day; the Metallic Extraction Co., Cyanide, cyanide, 400 tons per day; the American Reduction Co., Florence, cyanide, 50 tons per day; the London, Florence, cyanide, 50 tons per day.

As all the above mills are custom plants, it becomes necessary to sample the ores in a well equipped sampling works, so as to establish their values for purchasing purposes before going to the fine crushing department of the mill. Therefore, all the Cripple Creek mills have their own sampling department and storage bins ahead of the cyanide mills, and ores are held until satisfactory settlements are made.

From the samplers' storage bins the ore, which has been crushed to ½-inch size, is drawn into cars and trammed to the automatic feeders of the revolving dryers. After passing through the dryers the ore is elevated to the sizing screens; the oversize from the screens passes to the fine crushing rolls, and, after passing through the rolls, the ore is screened and the oversize returned and screened until all passes through the screens and is conveyed to the finishing pulp bins. Considerable care is given to the crushing of the ore, so as to produce as granular a product as possible for the leaching tanks, and a number of dust appliances are now in use to collect the dust that is made in fine dry crushing.

The Cripple Creek oxidized ores are treated without roasting, but the sulphide and telluride ores require it; therefore some type of mechanical roasting furnace is used. It has been a serious question to decide between the merits of the roasters in use, which are the Ropp, Pearce, Turrett, Argal and Improved Buckner, as all are capable of doing the work required in ores of this district, that is, reducing sulphur from 3 per cent to less than two-tenths of 1 per cent.

At the present time only two mills in the district cool the roasted ore automatically. The Metallic Extraction Co., at Cyanide, uses a scraping conveyor which scrapes the ores over a water jacket bottom. The same style is in use at the Colorado Ore Reduction Co.'s mill at Elkton. The same leaching department is used for either class of ore, raw or roasted.

The leaching tanks are generally made of $\frac{3}{16}$-inch steel plates, and are from 20 to 50 feet in diameter, and from 4 to 6 feet in depth. In each leach tank a false bottom, or filter bed, is made to suit the fancy of the man in charge. The style of piping and arranging the solution tanks, storage tanks and precipitating boxes is governed by location of plant as regards ground and engineer having plant under construction.

The following items give an idea of what is needed in the cyanide department of a mill: Standardizing tanks, leach tanks, gold solution tanks, zinc boxes, sump tanks, vacuum tanks with vacuum gauge, ejector or vacuum pump, solution pump, necessary piping and valve, vacuum slime filter, zinc lathe, muffle and bullion furnace, and a number of small items too numerous to mention.

The ore after being properly crushed and roasted, if necessary, is placed in the leaching tanks, and a weak cyanide solution is added, either from the bottom or top, and allowed to saturate the pulp and rise above the top about 1 inch. The time this solution is allowed to remain before drawing away and a continuous circulation started is governed by the treatment found necessary to obtain the quickest results on the particular ore in question. After the leach has been completed, washing of the pulp becomes necessary. This generally consists of about three washes. The quantity of water required for this purpose should be sufficient to displace as much of the remaining gold solution as possible, and in some cases a vacuum is used to dry the pulp to about 15 per cent moisture.

After the ore has been leached and thoroughly washed, it is sluiced out of the leaching tanks over some style of fine concentrating plant. At the present time two styles of such plants are in use, one having the Wilfley tables, the other, riffles and blankets. The idea of concentration is to recover the coarse gold which has not had time to be affected by the cyanide, and also any sulphides carrying values.

If a mill be located so it is short of water for sluicing purposes, it becomes impossible to concentrate after leaching, and the general custom is to shovel the waste material from the tanks.

The solutions containing the gold are then allowed to pass through zinc shavings, which are made as needed at the mill from sheet zinc, the gold and silver being precipitated by the zinc.

The "clean-up" of the zinc boxes is very simple, and the zinc slimes which contain the gold and silver are treated, as a rule, at the mill and the bullion shipped direct to the mint.

In most of the cyanide mills of the State a weak solution of cyanide of potassium is used, ranging from two-tenths of 1 per cent to four-tenths of 1 per cent, and a chemical and mechanical loss of cyanide from one to two pounds per ton of ore is made. The loss of zinc varies considerably, and ranges from one-quarter to two-thirds of a pound per ton of ore.

Below is the approximate treatment cost per ton of ore for a fifty-ton plant, running twenty-four hours:

	Per ton.
Labor in crushing department	$0 52
Fuel for dryer and steam purposes	48
Labor in leaching department	22
Chemicals consumed	74
Repairs, including screen wear	10
General wear	07
General expense	08
Insurance and taxes	07
Assay office and chemist	10
Office and management	17
To concentrate after treatment	15
Total	$3 70
If ore needs roasting, add to above	75
If ore is sampled before treatment, add to above	45
Making a total cost of	$3 90

The cost given herein will vary considerably, owing to wages paid and price of fuel, this estimate being based on $3 per day wages and coal at $5 per ton, which is the average cost in the mountains.

All the cyanide plants working on crude ore in Colorado are crushing between twenty and thirty mesh. The time consumed in loading, leaching, washing and discharging a tank containing sixty to seventy tons of pulp varies from four to twenty days; some of the important reasons for such a difference in time being the strength of solution used, value of ore, fineness of the gold to be dissolved, amount of silver and state it is in, condition of pulp, whether of a granular or slimy product.

The concentrates are generally rich enough to treat by smelting. If they are too low grade or too expensive shipping, it is possible in some cases to roast and retreat by cyanide.

The cyanide process is being used in various ways and in connection with other methods of treatment, viz.: Dry roasting and leaching; sampling, dry crushing, roasting, leaching and concentrating; sampling, dry crushing, leaching, only partially concentrating, making a low-grade concentrate, roasting the concentrates, and re-treating by leaching the roasted concentrates; dry crushing coarse, leaching, regrinding, amalgamating and concentrating; wet crushing, amalgamating, cyaniding the tailings and waste; wet crushing, amalgamating, concentrating and treating the concentrate by cyanide.

The cyanide process is used in a number of places to treat old tailing dumps, and has proven a great success. In some sections tailings are treated for $1 per ton, total cost, and in one place as low as 60 cents per ton. The mode of treatment is similar to that used in leaching crude ore, but as a rule some neutralizing agent must be used.

Up to the present time the treatment of slimes or a very slimy ore in large quantities by the present mechanical arrangements now in use has been a commercial failure, nor have we now in actual running shape a mill which has installed a system that can be considered or called a continuous method of agitating and filtering, thereby giving a continuous flow of ore treated, like that coming from a stamp or concentrating mill. Such an experimental plant, located in Denver, is now being thoroughly tested, and if found to be successful will be capable of handling slimes, also be a continuous process, and therefore will become a great addition to the future success of the process.

Chlorination.—The Cripple Creek and Boulder county telluride ores are at present the best in the State for the chlorination process. The largest mills are:

	Tons per day.
The Colorado-Philadelphia Reduction Company, Colorado City	250
The Gillett Reduction Company, Gillett	75
The Kilton Reduction Company, Florence	40
The El Paso Reduction Company, Florence	100
The Delano Reduction Company, Boulder	50

It requires about the same kind of crushing machinery as mentioned for the cyanide dry crushing plant, but, instead of crushing as fine, twelve to twenty mesh is all that is required, and by keeping the crushing coarse the washing of the pulp in the chlorination barrel is more perfect.

Every chlorination plant must roast the ore before treatment, and the same roasters are used as those employed in cyanide mills or smelters, with the same methods of cooling the ore before going to the hoppers over the chlorination barrels. The barrels in use vary in size from the five-ton barrel, which is about 5 feet in diameter and 9 feet long, weighing, complete, about 10 tons, to the ten-ton barrel, 6 feet in diameter and 14 feet long, weighing about eighteen tons. The shell of the barrel is made from heavy steel plate, with cast iron heads, well bolted, all lined with heavy chemical sheet lead. In the barrel is a filter which consists of a sheet of perforated lead, wooden segments and asbestos cloth, all put in to please the man in charge.

The roasted ore is charged into the barrel with water to make it of the proper consistency, and the required amount of chloride of lime and sulphuric acid added. After the barrel is charged it is closed and revolved slowly from three to eight hours, then the solution containing the gold is drawn off through the filter into lead-lined settling tanks. The filtering and washing are assisted by air or water pressure.

Sulphur dioxide and hydrogen sulphide gas are used by some of the mills to precipitate the gold from the solution, and the liquor is passed through a filter press, where the gold slimes are collected, then dried, roasted and finally reduced into almost pure gold by melting with proper fluxes.

The other method used to precipitate the gold from the solution is to pass the liquor through pulverized charcoal, which is finally taken from the precipitating boxes and spread on large roasting pans made of cast iron, and the charcoal burnt off, leaving a gold residue, which is mixed with fluxes, melted and run into bars.

The chlorination mills use the same methods of concentrating the tailings as the cyanide mills.

The chemistry of both processes has been avoided, as this article is intended to touch only the practical and commercial sides of the subject.

The percentage of saving by the cyanide process compares favorably with the saving made by the chlorination, which is 85 and 95 per cent of the assay value, some advantage being in favor of the cyanide process if the ore carries any silver, as the cyanide will recover from 70 to 80 per cent of the silver values, while chlorination saves no appreciable percentage of the silver.

The custom at the present time in the majority of the Colorado cyanide and chlorination mills is to build them of large capacity and to treat custom ore.

The general impression is that the day is not far distant when the question of roasting will be better understood, and the mining public will become better acquainted with the two named processes. Then the mine owner will build a mill of small capacity, adapted to the mine, as is now practiced by the mine owner who builds and owns his own stamp or concentrating mill.

Amalgamation.—A large proportion of the gold ores susceptible to amalgamation, in whole or in part, is reduced by stamps, with centrifugal mills of variable patterns a good second. While no radical changes have occurred, the old custom of feeding the battery by hand is almost wholly replaced. New equipment of crushers, rolls and automatic feeders at the "head" of the mill being quite common, and is now considered an essential part of the modern mill. The stamp battery as a reducing device has stood the test of generations, but its operation is almost as variable as the mills operated.

The old reliable slow-drop Gilpin county mill still holds sway in that region, and the question of utility as compared with the more modern compromise or quick-drop mills still remains unsettled except with the various patrons. What is known at the Gilpin county mill uses a 500-pound stamps, dropping 16 inches, thirty times per minute. The mortar is deep, with high issue, and a large proportion of the gold is amalgamated within the mortar before reaching the plates. Notwithstanding adverse criticism and the charge of doing poor work and little of it, these plants continue business and the operators and patrons express their sympathy for their modern brethren who have followed recent customs. In this particular section there is grave doubt of the quick-drop, coarse-crushing mill making as high a saving as the slow-drop, fire-crushing mills. This can only be stated as a matter of opinion based upon somewhat extended investigation, owing to the fact that the different mills operate upon different ores so that absolute comparison can not be made. A number of stamp mills have been erected during the pass year in various sections of the State and as previously stated differ materially in their method of operation. The tendency is, however, towards heavier stamps, faster drop and depending more upon the outside plates (the inside plates being often omitted) to collect the gold and the appended devices for concentration to recover the remaining values. The weight of stamps vary from 650 to 1100 pounds, the drop from 4 to 12 inches and screens from twenty to sixty mesh. The amalgamation plates are with few exceptions silver plated, but vary in size and pitch to suit the ideas of the operator. An increase in use of plates in "launders" transmitting the ore from the plates to the concentrating tables is worthy of mention. As a rule these plates are placed in the bottom and sides, but occasionally wing plates are set in so that the pulp is partially stopped by each and thrown from one to the other. The recovery upon these

*Condensed from Report of State Bureau of Mines.

secondary plates is variable, the most notable instance being an amount equal to operating expenses of the mill and claimed to have been entirely lost previous to their introduction.

The fact that absolutely free milling ores are very rare in Colorado is becoming more and more appreciated, and more attention is given to the recovery of values after the portion susceptible has been amalgamated, also to the commercial proposition as to whether a higher recovery from fine crushing and small tonnage is preferable to a lower recovery from coarser crushing and increased tonnage. In a number of cases the financial gain has been found favorable to the lower saving and increased tonnage, and values that ought to be recovered are thereby turned into the stream beds, not through ignorance but inability to increase milling capacity and necessity of making money to satisfy the stockholders.

Annual Assessment Work.

On page 545 of this issue is a notice of Judge Hallett, of the U. S. District Court of Denver, Colo., his experience in mining cases, and his action regarding mining experts.

Some time ago a case was before him in Denver, which illustrates another phase of his judicial action, and incidentally is of interest to miners and prospectors everywhere.

The case referred to involved the question of the annual work which the holder of a mining claim must do to prevent the loss of his title. The decision was in favor of the man who held the claim upon which it was said the annual work had not been done. In this instance there was some doubt whether the claimant had done $100 worth of work during the calendar year, and the plaintiff in the action jumped the claim on the theory that sufficient work had not been done. But the court brushed aside his alleged title, together with all consideration of whether the work amounted to $100 or not, by laying stress upon the fact that the locator resumed work upon the claim before the jumper's alleged rights began. The principle of law involved is not new but it is well for miners to bear it in mind. Annual assessment must be done, not to keep alive a title, but to prevent it from lapsing. In this instance it was, in the opinion and judgment of the court, a matter of indifference whether the annual work for the year in question was done or not, the locator having asserted his rights the following year before the other party to the location attempted to re-locate. If no one else asserts a claim to the property, a locator need not do any work at all upon his claim. He may locate it to-day and do none of the annual labor for ten years. Still, if then he should make the requisite $500 worth of improvements he would have a right to a patent, and his title would relate back to the date of his location, notwithstanding in the meantime he had done no work at all. But the prospectors should remember that in all such cases the risk is on them. A claim would be jumpable in the case supposed. It remains alive only because no one interferes with the rights of the locator. In this connection it is important to observe that the law requires $100 worth of work; and not 10 feet, nor 20 feet. In many Colorado districts it is a custom to call 10 feet sufficient compliance with the law concerning annual labor. But the custom of a mining district cannot and does not do away with the federal law. Every Colorado locator who does only 10 feet of work, which is not, as a matter of fact, worth $100, runs the risk of having his claim jumped unless in the following year he resumes labor upon it before any jumper attempts to take possession. Five dollars' worth of work or no work at all may suffice if no one disputes the possession, but $99 worth will not suffice, if before the resumption of labor the following year the claim is jumped.

Production of Asphaltum in '97.

An abstract of the report of E. W. Parker, statistician of the U. S. Geological Survey, on the production of asphaltum in the United States during '97, shows that the aggregate production of asphaltum, bituminous rock, etc., in '97 amounted to 75,945 tons, valued at $664,632. The production of ordinary crude asphaltum in California decreased from 6500 tons in '96 to 5971 tons in '97, but the average price per ton was practically the same in the two years. The production of California, Colorado and Utah in '97 was as follows: California, 68,650 tons; value, $598,502. Colorado and Utah, 3700 tons; value, $47,500. Total, 72,350 tons; value, $646,002.

At the close of the Midwinter Fair in San Francisco four years ago, the big electric searchlight was taken to Mount Lowe, Cal. Among other war preparations, the Government has leased it for use in San Francisco bay, in connection with the fortifications. It is said to be the largest searchlight in the United States, being 10½ feet in diameter, and weighs about 6000 pounds. The mirror used in the projector is 5 feet diameter.

COMPARISON is constantly and cordially invited.

Some Metallurgical Methods.*

G. H. Blakemore, Gen. Mgr. Lake Illawarra Smelting Works, Australia, made some recent extended remarks before the Australasian Scientific Association which illustrate the local point of view regarding furnaces and smelting methods there. He said:

At the British mine a change was made in the design by John Howell, who substituted mild steel jackets for the brick shaft of the furnace of Mr. Schlapp's design. One great trouble in a lead furnace, when smelting sulphide ore with or without zinc, is the manner in which the sulphide causes the formation of crusts or scaffolds in the furnace 12 inches to 18 inches below the level of the top of the ore charges in the furnace. As the lead sulphide reaches the smelting zone of the furnace part of it sublimes and ascends through the loose ore, and deposits again on the cooler walls of the furnace. With a brick furnace the walls of the shaft are never so cool as the water-jacketed shaft, and the sulphide of lead and zinc seems to incorporate itself with the bricks. When this crust grows to such a size as to materially interfere with the working of the furnace it is usual to run the furnace down, stop putting fresh charges into the furnace, and allow the level of the ore and fluxes to sink until it gets considerably below the crust or scaffold. Then the blast is taken off the furnace and the crust is prized off. The disadvantage of the cementation of the crust with the brick walls is then seen. The crust, being all of a dull red heat, one may chip pieces off with laborious effort, but an attempt made to clean the walls to the original form of the furnace shows that the crust has become part of the brick shaft, and the latter gets very much damaged in the operation.

With the water jacket walls the crust is a very different concern. Instead of being a solid, tough and immovable obstruction, there is but one place in it that is hard, naturally the face exposed to the heat of the furnace. Behind this hard face is a mass of loose ore, which falls away as soon as the hard shell on the outside is destroyed. Then, the crust does not form any sooner on the cold water jacket than it does on the brick shaft, because the attrition of the descending ore charge has effect on its peculiar form, and it is much more easily removed from the cold iron face, usually in six hours, leaving the furnace its original size. With the brick shaft this may take twelve to eighteen hours, and when left at that is not anything like clean, through the fact of the crust having filtered into the pores of the brick and made itself a part of the structure as before described. Much has been said against the water jacket shaft on the ground of increased fuel necessary through the amount of caloric carried off by the water, and a nice mathematical calculation is not sufficient to overcome the great advantages which the water jacket shaft has over the brick, and no more fuel used with the water jacket shaft than with the brick shaft furnace.

It is no uncommon thing to see a number of the brick shaft furnaces being burnt out just above the lower jackets. Unskillful work is the natural retort, but with the irregularity in composition of the ore this might naturally be effected. Such a trouble is never experienced with the other style of shaft, and the test of experience has demonstrated there that for good, fast, clean and cheap work the all water-jacketed blast furnace is the better. The top half of this furnace consists of hollow wrought steel jackets, with a 6-inch water space, three jackets being 9 feet 9 inches deep; the fourth, recessed to carry the flue or downcast, is 8 feet deep. The water is fed in at the bottom of each jacket with the view of preventing the deposition of any sediment, and the whole of the jackets are connected, to make sure of an equal water circulation through them all. The jackets are supported by lugs, which are riveted on them, standing on an oblong framework of 8-inch I iron, the corners of which rest on four hollow cast iron columns or pillars, serving also as waste water pipes. The jackets are surrounded with an iron strap, making the whole a stiff and strong job. The structure at this stage, and before the lower jackets are put in place on the brick crucible, presents the appearance of a large rectangular box, with rounded corners, not having any bottom or top, standing on four legs—the columns. The lower half of the furnace consists of twenty cast iron hollow jackets, each 20 inches in width by 57 inches long. There are six jackets on each side, with a circular opening cast in them large enough to allow a water-jacketed tuyere to be entered, and these tuyeres project beyond the jackets into the furnace some 9 inches. Four corner jackets have no tuyere openings, and four end jackets (two each end) have 4-inch openings in them to admit air, but no water-jacketed tuyere.

The water is fed into the top of each of these jackets, and is conducted to the bottom by a passage cast inside the jacket. The escape is from the top, and by having a pipe bent somewhat to the shape of the letter S, the delivery of the water is effected into a launder at a point 9 inches above the highest point of the jacket, doing away with any chance of steam gathering in it. The launder can thus be made a fixture, and does not require to be moved when a jacket has to be taken out of a furnace.

All the water from the top and bottom jackets, tuyeres, breasts, separators, and slag spouts delivers into the launder, which surrounds the furnace, and this in its turn empties the water into the hollow columns which support the top jackets. From these columns pipes underground carry the water to cooling tanks, from which it is pumped back to the supply tank for use again. Each of the lower jackets has three lugs for bolts on each outside perpendicular edge, and, in addition to bolting the whole of them together, a binder of 60-pound steel rails goes around them to stiffen the structure. The crucible on which these jackets stand consists of a large pan made of ½-inch wrought iron plate, in which brick is laid with fire clay to form a basin or well to collect the lead reduced from the ore. The lead is drawn off from this well by a passage in the brickwork, starting at the bottom of the well, and passing up and outwards at an angle. This system is not a syphon, the lead simply rising in the passage and obeying the law of all liquids in finding its level. The Matthewson matte separator is an ingenious arrangement, which takes advantage of the presence of the blast in the farnace to have the slag forced to deliver at a higher level outside the furnace than it lies inside. It is satisfactory only when small quantities of matte are being produced.

The brick shaft furnace requires no description other than that the brick shaft is supported on a heavy cast iron entablature, supported on cast iron columns. The all-water jacketed furnace just described measured 50 inches wide, and 132 inches long at the lower jackets; 34 inches wide between the noses of the tuyeres. It was nearly 17 feet deep from the feed-plate to the bottom of the crucible. Since these furnaces have been built much larger furnaces on the same design have been erected at other works, and have given satisfaction.

(*To be Continued.*)

*Condensed.

THE freedom from competition in gold mining gives an impetus and advantage to this class of industry that is not enjoyed in any other line of business; the product is always marketable. Many capitalists and investors have overlooked mining as a source of wealth and field for investment, because they are unacquainted with mining matters and mining business. In modern mining chances are reduced to the minimum, and do not enter into it in the degree that the newspaper and daily conversation would indicate. Operations in mining can in an anticipated way be placed and the results estimated with some precision. In the past decade great improvements have been made in the methods of mining and treating the ore. A great change has been made by cheap and rapid railway transportation by the reduction of expenditures for labor and supplies and by improved mining and milling. The success of mining primarily rests on the mine itself. If a good property is secured and the management be honest, competent and skillful, success is as likely as in other forms of business.

"A MODERN gunner," says an official in the United States army in a recent article, "must be able, while shells are bursting above his head and his comrades are falling around him, to work out a problen like this: "That ship is three miles off; she is approaching at such and such an angle, her speed is fifteen miles an hour, the forward turret is the place to hit, the wind is strong from 9 o'clock, the temperature is 75 and the barometer is 30.06, I must, therefore, give so many degrees of elevation and allow so many points for windage." Having done this, he must aim his gun with the greatest rapidity and exactness and fire. If he makes a mistake in any of the factors of his equation, or lays the gun so that the variation of the sight is greater than a fiftieth of an inch, his shot is wasted. If he is right in everything, he may disable the ship he fires at, and by so doing save the city he is protecting." A single load for a 13-inch gun costs about $1250.

AT the time of the civil war electricity was little known; conditions then were very different than now: of the effect of war upon the electrical industry there is no precedent. The uncertainty of the past few months has caused a number of contracts to be withheld, but the Government has been a large purchaser. The exports of electrical apparatus during the last fiscal year were $3,054,453; the current year may exceed this, and there seems no reason to believe that war would in any way curtail the expected increase.

THE plans of the Board of Public Works for the improvement of the Sacramento river, Cal., have been approved by the chief engineer and the Secretary of War. The permit was sent from Washington, D. C., on the 19th. This enables the State to carry out its plans for river improvement. They include, among other things, the removal of the Newtown shoals, the building of easements and the construction of wing dams.

THE melting point of commercially pure aluminum —98½ to 99 per cent—is 1160 degrees F., 626 Cen.

Speed Government in Water-Power Plants.*

NUMBER II

MARK A. REPLOGLE.

The second factor to be considered is the water wheel itself. It has a possible range of speed from zero to even faster than the spouting velocity due to the head, and it is unlike a steam engine in many respects. Its periphery must move at a velocity that is a proper ratio to the spouting velocity of the head, in order to gain the highest efficiency of power. The wheel also allows practically the same quantity of water to pass through it at any of its possible speeds. If any difference, it allows more water to pass through it at underspeed than it does at overspeed. So it can be readily seen that an accurate gauging of the water that enters the wheel does not necessarily have anything to do with the speed. The speed of wheel is the result of quantity of water combined with pressure on one hand and load of work on the other. Therefore, any change in one of these three factors causes a change in the speed.

If a wheel at the end of a long closed pipe containing hundreds of tons of water were running at normal speed, carrying a certain load, its speed would remain constant if no changes were made in the conditions. If, however, the gates were slowly opened, its speed would be increased by the greater quantity of water entering it. If, instead of this, a part of the load were dropped off, the speed in like manner would rise. If the gates were slowly closed the speed would soon begin to fall. But if the gates were rapidly closed the momentum of this column would cause a much greater pressure at the wheel gate openings, and for an instant cause practically the same amount of water to enter the wheel at higher velocity. This amount of water having higher velocity will contain more energy or power for the time being, and of couse will impart more to the wheel, increasing its speed slightly for a short time instead of immediately decreasing it, as would seem natural. This tendency for an increase in speed, added to the increase already caused by a part of the load being dropped, will make it necessary for a greater amount of work to be done by a governor than would be proper after the momentum effects in the pipe had subsided. It can also clearly be seen that, if the gates are opened again quickly, the velocity of the water entering the wheel will be decreased until the whole column acquires an increased motion; hence, the power applied will be diminished for a time instead of increased. These momentary and opposite effects make water government a harder problem to solve than the government of steam.

Third, water wheel gates, as compared with steam valves, are heavy and unwieldly. They must also be moved through water, which is much denser than steam, hence cannot be moved with the same facility. They require much more power for their movement. Sometimes the designer of a water power plant does not place importance enough on the government of the wheels to make substantial gate rigging. The gate shafts may be too light, showing torsion when operating, or there may be a train of cog gears that allows much lost motion. The gates may be so designed that the water pressure gives them an unbalanced condition, requiring much pressure to be neutralized before it is possible to move them in a reliable manner. Turbine wheel gates built in this country often weigh several thousand pounds each, and sometimes must be moved several feet through water in being opened. Often it is necessary to add weight equal to their own weight as a counterbalance. The power required to overcome the inertia of and move this great mass often reaches many thousands of foot pounds. It can readily be seen that to govern such gates with precision and accuracy requires a combination of both delicate and powerful machinery. Also, when it is considered that it is possible to make the full change of an electric load in the fraction of a second and impossible for gravity to meet the power demands short of a number of seconds, it is plain that to govern a water power plant successfully is a matter of more moment than would seem at long range. It must also be borne in mind that the change of load must occur, and the speed must be impaired before it is possible for a governor to operate at all.

The fourth element to be considered is gravity, the source of all energy or power that can be had from water. Its effect can be considered as a constant in reasoning about power getting. Of course, it is variable within certain limits. A square inch of opening at the bottom of a vertical column of water will allow gravity in a given time to generate a number of foot pounds of power, and in direct ratio to its height. This power is absorbed in giving velocity to a steam of water an inch square and spouting a number of feet per second. Gravity has established an epuilibrium in giving this velocity to the water. If the opening were increased the power generated would increase in like ratio. It is the duty of the turbine wheel to reduce the velocity of this water as nearly as possible to zero without changing its own speed. In so doing the power is transferred to the wheel shaft, where it can be carried to other points. With exception of the small amount of power that is required to give a slow, downward movement to this vertical column of water, it can be said that the full effect of gravity is represented at the gate opening. Also as soon as the opening is increased or diminished, there is practically the same increase or diminution in the amount of power represented by the volume and velocity of the water.

Again, if this column of water extended in a horizontal direction from the top of the vertical column and the whole encased in a closed pipe or trunk, it can readily be seen that, when gravity operates on one square inch at the foot of the vertical column, it must put in motion the horizontal mass of water at the same time that it does the vertical mass. It is plain then that, while gravity has begun active operation as soon as the opening is made, its full effects will not be represented at the opening or wheel until the whole mass has been supplied with enough kinetic energy to give the necessary motion for the full spouting velocity at the gate opening. It is apparent that, while gravity is limited in the amount of power it can supply in a given time, it can be, and often is, further limited in its time of supplying power for governing purposes by the use fo long pipes.

Considering the facts, that a change of load must be made before a governor can begin operating, that it requires time for a governor to perform its operation, that torsional and lost-motion effects are found in all gate riggings, that gravity must have time to do its work and may further be obstructed by injudicious flume construction, and that the wheel is limited to a certain opening and need not necessarily run in the ratio of the amount of water passing through it, it follows that absolute speed cannot be obtained in water powers under heavy changes in load, as a change in load must necessarily change the speed before it is possible for gravity to furnish an increase in the supply of power. If there were no other factors government would be an impossibility, as a change of 50 per cent in load would instantly cause a change of 50 per cent in speed. But there are other factors, and, be it said to the credit of the great engineers who designed America's greatest water power plant, these other factors were clearly understood, intelligently calculated and incorporated into its construction. They are visibly stamped in every part of its make-up. (Plate II.)

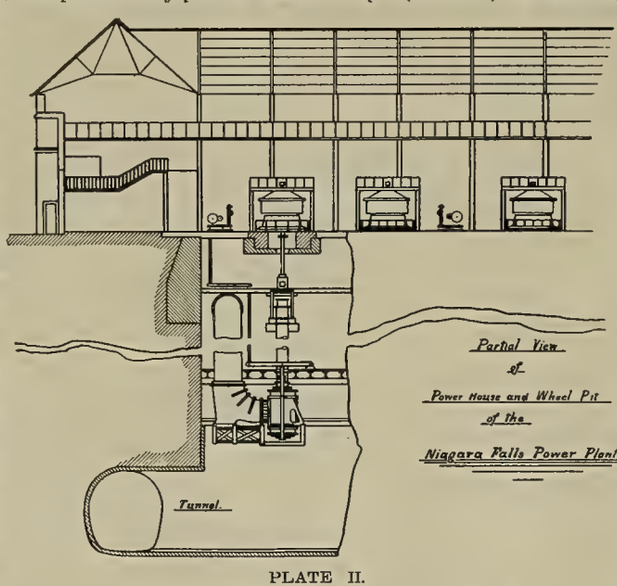


PLATE II.

The first notable element is the size of the power units, 5,000-horse power each. The second is the capacity of each unit for a storage of kinetic energy. It is absolutely necessary to have an accumulation of energy in reserve to tide over sudden fluctuations in load until gravity can make proper compensation. The designers of the great Niagara plant first determined the degree of government necessary or desirable, and from this as a basis the plant was constructed. The results show that the speed government is well within the limits for which the units of power were designed. It is evident that there is a great accumulation of energy in reserve when an instantaneous change in load of 1000-horse power causes only 2 per cent variation in speed, especially when the conditions are such that it requires about three seconds of time for gravity to increase the power supply to this amount.

There are several methods by which a reserve storage capacity can be maintained, but the one used at Niagara seems to be the simplest and most reliable. It certainly is the cheapest, being also purely mechanical. Reference is now being made to the balance-wheel or momentum effects of the revolving parts. It will be remembered that the armature, which is usually the lightest portion of a dynamo, is stationary in the Niagara Falls plant, while the field magnets, supported by an immense steel band, are the moving parts. It is also noticeable that the great shafts reaching downward to the turbines are of large diameter, being great tubes. This is for the purpose of giving high velocity to as much of the material as possible. A certain capacity for stored energy was necessary for good government, and it is safe to say that if this could not have been reached with the present weights and velocities of parts, more would have been added in the form of actual balance wheels.

(To be Continued.)

*Journal of the Franklin Institute.

Cyaniding and Chlorination.

Which of the processes is the cheaper—cyaniding or chlorination? asks the Nelson, B. C., *Miner*, and says:

An attempt will be made to furnish an answer without entering too much into technical details. The drift of recent experience in this direction has been to show that cyaniding is liable to be cheaper than chlorination:

1. If the ore does not require roasting.
2. If the gold is not too intimately combined with pyrites.
3. If the character of the auriferous ore is of a more basic than acid nature.
4. If the chemical supervision of the process is above all criticism.

In the few rare instances, when the majority of these conditions is fulfilled, the cyanide process can be considered a success. Thus on the Rand the treatment of tailings has yielded good results. It appears that in this case the gold is not intimately associated with the pyritic portion of the tailings; neither is roasting required, owing to the absence of tellurides. In this country the Mercur mine, Utah, has applied the cyanide process with marked success. In this case the ore is a silicious limestone, and the gold occurs as a fine coating on particles of magnetic iron ore.

On the other hand, chlorination is applicable under all conditions, excepting the rare cases when the gold-bearing rock contains a notable quantity of lead minerals or carbonates, which are decomposed by acids.

An objection, which is frequently made in discussing the chlorination process, is the costliness of the plant on account of the necessity of roasting. But is the sweeping statement of the partisans of cyaniding, that roasting is not necessary for their process, really well grounded?

Recent experiences point in another direction. It appears that in most cases the extraction of auriferous pyrites by cyanide solution is promoted by light roasting. In the case when gold occurs combined with tellurium as telluride, roasting becomes absolutely necessary. Some of the cyaniding plants which have been recently put up in the Cripple Creek district have made provision for the erection of roasting furnaces.

As an important argument in favor of chlorination, the fact should be mentioned that the chemistry of this process is less complicated than that of cyaniding. The difficulties of cyaniding, as they present themselves, particularly in Colorado, have been vastly underrated, owing to the comparatively good results on the Rand. The fact that cyaniding is a chemical process has been almost entirely lost sight of in the western States. The managers of the existing works are, without a single exception, mining engineers, but not chemists, while to overcome the difficulties which characterize the cyanide process, chemists are needed who are able to solve independently new problems and not merely to make tests and assays. At present it is impossible to secure such competent men at the low rate of wages usually paid to chemists in the western States.

As far as the cost of plant is concerned, the expenditure for erection of a chlorination works is at present somewhat higher than for a cyaniding plant, as the latter does not include lead-lined vessels; on the other hand, it is reasonable to expect that the cost of chlorine will soon become very low, owing to the recent improvements in the electrolytic production of this chemical from brine, while the price of potassium cyanide has probably reached its lowest level.

Briefly summarized, the conclusions which have been arrived at are: Under exceptionally favorable conditions cyaniding is cheaper than chlorination, but under all circumstances it is safer to operate chlorination works. Chlorination can be successfully applied to almost any ore, while cyaniding gives satisfactory results only with a certain class of ores. Cyaniding plants located in such localities as Cripple Creek run certain risks, as the character of the ores from this region is liable to change from day to day. Apart from that the cyanide process labors under the disadvantage of requiring, in most instances, an extremely skilled chemical supervision. The chemical part of the chlorination process is, on the other hand, very simple. Lastly, the recent developments

in the electrolytic preparation of chlorine open up the prospect of a great reduction in the price of this chemical. Some of the gold-producing western States abound in coal, salt and water power, which are the essential conditions of the cheap preparation of chlorine.

Mining Summary.

CALIFORNIA.

Amador.

Sinking is going along at the Anita mine and will continue until a depth of 1000 feet is reached.——No work is being done at the Alma, but it is locally said the company will try it again in a few months.— The shaft in the tunnel at the Amador Queen No. 2 is down 125 feet, and sinking will be continued until 1000 feet is reached.——At the Argonaut there are about 100 tons of sulphurets on hand. Several dividends of 10 cents a share have been paid and about $100,000 in the treasury. The few months' run is highly satisfactory to all concerned.——The Amelia mine has reached a depth of 600 feet and sinking continues. Water has interfered with the work somewhat and a pump will be put in. ——Pratt & Hardy located a claim in Amador creek and will work the tailings from the mills which have dumped into it for forty years.—— B. Levaggi, assignee, has commenced an attachment suit against the Columbia G. M. Co. at Plymouth for $2357.18.

The Blue Lakes Water Co. is extending its electric line from the South Eureka mine to the Sutter Creek power plant, and, when completed, the Amador Electric Railway & Light Co. will use energy direct from the Blue Lakes Water Co.——The Amador *Republican* says it is reliably informed that the capital necessary to carry out the Blue Lakes Water Co.'s scheme of transmitting electric energy from their plant on the Mokelumne river to San Francisco is ready to be invested. The capitalists are waiting for the report of the expert who has been investigating the proposition. If his report is favorable, work will begin at an early date. It is expected that by June 1st the matter will be definitely decided.

Butte.

The Silva Co. at Cherokee are said to have realized $10,000 from their recent clean-up.

Calaveras.

Work is progressing with satisfactory results at the Thorn mine near Angels Camp. W. Garrard is Supt.——The McNear mill started on quartz from the Red Gold mine. Work in the levels is suspended until the completion of the hoist and the placing of machinery for thorough work.——Work has been commenced on the Schaeffle gravel mine, near Murphys.——The Woodside M. Co., near Angels, are preparing to build a 40-stamp mill and electric motor.——Everything is running in good order at the Smadeke mine at Smiths Flat. Sinking goes on.

The 8-stamp mill on the Moser gravel mine at Mokelumne Hill is nearing completion and will soon be ready to drop stamps, provided water can be had.——At Robinson's Ferry W. C. Ralston has thirty men at work in the Melones tunnel, the object being to get under the highest point on Carson hill. The tunnel at present is in 2100 feet.——The Stockton *Mail* has been informed that the Thorpe mine, at Fourth Crossing, was sold or bonded to the Princess Co., in which Prince Poniatowsky is interested, for the sum of $250,000.

El Dorado.

(Special Correspondence.)—The Gentle Annie mine is building a cyanide leaching plant to work their sulphurets. The ore of this property carries a fair percentage of sulphurets of very good value.

The Vandalia mine, located thirteen miles west of Placerville, which has been abandoned a number of years, has resumed work under a new ownership and is meeting with good success. They have a large ledge, much of which is good grade and all of it easily worked.

J. Melton has run a tunnel on the vein in the old White property, and is taking out good ore. He has a depth of 600 feet in the present tunnel, but is beginning another considerably lower. He contemplates building a 15-stamp mill for which he will be ready very soon.

At the Ohio mine near Greenwood, a good vein has been found below the 300 level.

In the Gold Note and Philadelphia properties near Omo, which Senator Chapman recently purchased, thirty men have been put to work. An entirely new plant, including stamp and saw mills, will be installed.

The Taylor mine shut down last Saturday night; the cause is not known here. It is current rumor that the property is changing hands.

The Crown Point properties south of Placerville, were sold last week by, Thomas Clark to a Scotch company and work will begin on them without delay.

Placerville, May 16th, '98.

Fisher & Luce are developing a quartz property near Middletown. —— Hancock & Marquardt are washing 3000 carloads of gravel on their property near Granite Hill.

Nugget: At the old White mine J. Melton has cut through 25 feet of pay ore.——At the Gentle Annie sinking continues. Ore is being milled from the 500 level.——The business troubles of the Pocahontas have been adjusted and work will be resumed.

Democrat: The Union mine, from a seven days' run, cleaned up seventy pounds of amalgam.——Work continues with success at the Sunrise mine, near Kelsey.

Inyo.

F. Meysan, near Lone Pine, is developing a group of claims on which he is said to have a 40-foot ledge nearly the length of three claims. Assays show an average value of $5 per ton.

The Inyo M. Co. near Darwin made a strike on the 700-foot level of a body of copper ore, large in extent, which will make four different ores now being taken from this mine—gold, silver, lead and copper. A smelter is being put in which will add materially to the output, as heretofore all the ore was shipped. Owing to the recent copper strike, additional mechanism for smelting that ore will be put in, and within three weeks the smelter will be in operation. The payroll of this concern is now about $2000 a month. The mine has been a heavy ore shipper for a year.

Kern.

The Hard Cash M. Co. at Randsburg shipped twenty tons of ore to be treated with a dry concentrator. The ore averaged $16.50 per ton. The experiment proved satisfactory to both the owners of the mine and the concentrator.

Madera.

(Special Correspondence). — The Standard mine, heretofore operated by W. J. Henderson under a bond, has been sold to a New York company, which proposes to overcome the scarcity of water difficulty under which the mill on the property has labored for some months past, by a pipe line from Fine Gold creek. All the ore in sight is of good grade and the vein is 2 feet in width.

At the Starbuck mine a drift has been run from the bottom of the incline southerly and a vein 18 inches wide of $80 ore opened up. The ore from this mine will continue to be shipped to the Selby works for treatment, as much of the value is in sulphurets.

At the Safe Deposit location on the Magnet lode a chimney of ore 3 feet in width and averaging $8 per ton in free gold is being opened up near the surface to determine its extent. The walls of the lode are here 18 feet apart and perfectly defined. This ore body has now been uncovered for a distance of 60 feet and still continues southerly, the ore increasing in value in that direction, and the chimney apparently widening in its course downward.

The Mud Springs mine continues to furnish good ore at the 400-foot level and the mill is run about half of the time, there not being water sufficient to run continuously.

O'Neals, May 15th, '98.

Nevada.

Work on the Mineral Hill mine, near Graniteville, has been resumed and a 5-stamp mill is to be built for prospecting purposes. The ledge is large; in some places it is 40 feet wide. The property is near the Spanish, and is said to be of a similar formation. The mine is bonded to E. J. Hegarty of San Francisco.

Sinking the shaft at the Bellfontaine mine, near Nevada City, has been resumed.——G. Fellows of Santa Rosa is developing a property near Moore's Flat.

Placer.

A test run of ore at the Last Chance mine, near Emigrant Gap, gave satisfactory results. The 10-stamp mill will be in operation soon. The property is equipped with steam and water power. Twenty-five men are employed. C. W. Porterfield is Supt.

Sentinel: The Prairie Flower quartz mine, near Canada Hill, comprises three full claims. Average width of ledge, 2 feet; ore free milling, paying about $10 per ton. The ground is opened up for about 300 feet. A new tunnel is started which will tap the ledge at 400 feet. Ore can be mined at a cost not exceeding $2.50 per ton. Daily capacity of the stamp mill is fifteen tons; mill run by steam. The company proposes to put in a pipe line this summer. G. W. Payne is owner and Supt. ——C. C. Handy has ten men at work on the Boulder. He is drifting and stoping on the 250-foot level.——C. A. Reed is stoping at his St. Lawrence mine. A run of eighty tons of rock paid well. A shipment of selected ore netted $200 per ton.

The Pioneer directors have under consideration the question of doubling the number of stamps to forty. The company is reported to have ore reserves and sufficient ore in sight to keep forty stamps running full time. The flume to be constructed from the new reservoir will be 6 feet square. The April statement of the Pioneer Co. shows 960 tons crushed; value, $13,102; expenses, $6,422; income, $6,680; per ton, $13.64. The statement for the eleven months ended April 30 shows gross income of $134,320, and net earnings of $68,860. The average value of the rock crushed for the eleven months was $15.95.

Plumas.

The *Bulletin* hears that work in the Green Mountain mine near Crescent is discontinued. —— Mrs. McClure of San Francisco has purchased an interest in the Klondike mine near Quincy and begun prospect work. E. A. Hallstead is Supt.——The Golden A. C. M. Co. resumed work on their property at Bear Creek. They employ twelve men.——The tributers on the Plumas-Eureka have discontinued work.——W. Passeta has five men near Johnsville on the tailings of the Jamison mine.

Riverside.

Considerable work has been done on the Alice mine, near Perris, during the last few years. A short time ago a mill was erected, but after it was put up it was fonnd that the ore could not be worked by the mill process. It is stated that the owners of the mine, L. M. and H. D. Wilson, have associated with them several Los Angeles men of capital, and active work at the mine may begin before long.

San Diego.

Union: The fourth report of Receiver Pauly of the Golden Cross mines has been filed. There was on hand at the time of the last report $55,267.69, and the clean-up on March 1 netted $38,704.84. There was received from other sources $1332.81. The receiver says that he continues to make a profit out of the property and believes he will be able to continue the payments provided for in the stipulation recently made.

The receipts of gold bullion from Lower California this month are in excess of last month's receipts. Gold to the value of $1000 was received from Alamo, and the steamer Pacheco brought up forty small lots of gold aggregating $1200.——New placer ground has been discovered between San Diego and Campo.

Shasta.

J. McGowan has suspended work on the Delta mine, near Delta, on which he holds a bond, on account of scarcity of water for power purposes. He contemplates laying 300 feet of pipe. The ledge in this property averages 3 feet in width. The tunnel is in 350 feet and 60 feet on the ledge. Thirty-two tons of ore, milled as a test, yielded a good profit.

The Three Sisters mine, near French Gulch, which was bonded by J. V. Motherwell and M. D. Howell, is now under six months' lease to J. V. Motherwell and some Deadwood parties. Water is the great obstacle to contend with, but this season will prove particularly advantageous owing to the lack of rain. Work will be prosecuted without delay.——W. T. Cook of Napa purchased the White Cloud and Black Diamond mines, near Muletown, and is pushing development of the property.

Sierra.

Work has been resumed at the Mountain mine, near Sierra City.

Siskiyou.

News: Jones & Daniels have started their mill in Quartz valley.——Mr. Hobart is piping at his Quartz valley hydraulic mine.—— McCall Bros. will put up a small mill on Patterson creek. They have considerable ore on the dump.——The mining activity at present is along the Klamath river, where river claims are having a good season.——On the north fork of Humbug the Shurtleffs have been running their 2-stamp mill with good results. About ten men are working in the mine. Their ledge is from 2 to 4 feet wide. The mill crushes seven tons every twenty-four hours. It is the intention to add two more stamps.——Good quartz has been found at Patterson creek, in Scott valley, by the McCall Bros., who contemplate putting up a small mill.——Marye & Tuttle have discovered a quartz ledge near Cottage Grove which prospects well.

Journal: J. Ironsides discovered good quartz on Cherry Creek.——The Greenhorn Blue Gravel Co. continue to find good pay gravel. The new shaft furnishes a good supply of water, which after being used once is pumped back into a reservoir. By this means a good supply of water is maintained during the last part of summer, when underground springs commence failing.——B. Reed is running his quartz mill steadily, which pays well, he has an abundance of quartz of good quality. ——The Klondike Co., running a tunnel through the Humbug range near town, have reached hard base rock again to render progress slow, but find more quartz seams with considerable sulphurets, also iron and galena. The tunnel has been extended nearly 400 feet, the last 9 feet being in blue rock formation hard to drill, sulphurets and gold being found in the base rock as well as the quartz seams.

Trinity.

T. & B. Hart, after five months' work on their gravel mine near Douglas City, cleaned up $1200.——Bryan & Loftus have let a contract for a 150-foot tunnel on their property near Carrville.——A shipment of ore from the Lappen mine near Deadwood yielded over $200 per ton.——Work is progressing on the Tourtelotte mines near Minerville.

The Bloss & McClary mine at Trinity Center will close down in about a month—much earlier than ordinary seasons. A highly profitable run will have been made this year.—— At the Johnson & MacLeod mine a small mill is employed to handle the talcose surface dirt. ——The Bonanza King mine is now owned by Vollmers, Ellery and Tillman, who purchased the one-fourth interest held by G. R. Doty. ——H. Z. Osborne & Co. of Los Angeles are opening a property near Trinity Center. A tunnel is being run to cut the ledge at 300 feet depth.

Tulare.

Five tons of rock from the Woody mine near White river cleaned up $43 to the ton.

Tuolumne.

The Santa Ysabel G. M. Co., in common with many other California mines, is having trouble with its present water supply. Twenty stamps were operated in April. The ore ranges from $9 to $14 a ton and the company has been for some months earning more than expenses. The management expects soon to cut into the Nyman ore body on the 200-foot level.——The North Star, on Tuolumne river, is being developed by J. Joseph. ——At the Black Oak mine Demarest & Fullen are putting in two 10-inch plunger pumps. This mine employs forty-five men.——At the Omega drift mine, near Montezuma, a new development, good gravel is found and work will continue all summer.——In the Agnes mine a 14-inch vein of good ore was discovered at 60 feet depth.

The Rawhide mine is employing about 100 men. Stoping is in progress between the 1200 and 1100-foot levels.——The Arbona mill at Tuttletown is running day and night.—— The Bown mine is said to be showing good results.——The Bell mine is sinking on a rich pay streak. Twenty-six men are employed. ——The Golden Star mine has closed down, as the operators, is is said, could not get an extension of the bond.——The Good Hope mine on Jackass hill is in operation.——The Marryatt is working night and day. This property will be kept running all summer if water can be procured.——The Norwegian mill has been running but three days in the week on account of scarcity of water. It is expected the mill will be closed in two or three weeks for the season.

Democrat: In the Jumper mine the main shaft has reached 675 feet. At 700 the vein will be crosscut and drifted on north and south. On the 400, 500 and 600 levels the drifts both ways on the ledge are being extended, showing large bodies of high-grade. The twenty stamps of the mill are dropping day and night; twenty more will soon be added. These would be put in position at once were it not for the shortness of the water supply. The Jumper Co. purchased two tracts of land. On one of these, which parallels the Jumper and New Era mines on the east, a three-compartment shaft will be started at once.——At the Black Oak it is believed a contact has been made on the eighth level 500 feet north of the main shaft. The owners are putting in two 10-inch plunger pumps with a capacity to handle 21 inches of water. An auxiliary 250 H. P. steam plant is also being put in, which will insure continuous operation, regardless of dry seasons. Since the new chute was tapped little work has been done, and its real value has not been determined. The last work done at the 1000 level uncovered a body of ore of high-grade. Average samples assayed $103 per ton.——In the Dutch mine the main shaft is down 725 feet. The ore is reported good, and enough is being extracted to keep the twenty stamps dropping steadily. The principal work is on the 600 level, where the big vein is being drifted on. Supt. Trittenbach has sixty-five men on the payroll. The foundation for a new air compressor, to run ten drills, is being put in. The Dutch is equipped with steam in every department. The Gates canvas plant is being enlarged.——Work at the Hope has been stopped a few days for general repairs.—— The Noonday quartz mine, near the South Fork of the Stanislaus river, has been bonded to E. A. Davison for $20,000.——The Doyle property on Horseshoe Bend, comprising 160 acres, containing two veins of quartz, is being worked by Stover & Shorey, who have been opening up the property for eighteen months. What is known as vein No. 1 has been stripped for 900 feet and prospects well. A 6x8 shaft is being sunk, and crosscutting shows 25 feet of quartz that assays from $2 to $7.50 per ton. This shaft has been driven 90 feet, and at 100 feet the ledge will be crosscut. The rock is heavily sulphureted. When the contemplated development work has been done a mill will be erected. It is estimated the ore can be milled for $1.50 per ton.

Independent: At the App mine the 20-stamp mill is in steady operation.——At the Santa Ysabel group everything is in operation; the various shafts and drifts are being worked with vigor.——The Golden Rule is being developed from the 600-foot shaft by drifts north and south.——The 10-stamp mill on the Longfellow mine commenced running last week. ——At the Agnes mine drifting is being done east and west from the shaft.——The Lost Fox mine has been started under P. G. Carrigon, Supt. Grapevine M. Co. A force has been set to work sinking shaft and drifting. The ledge is 8 feet wide, carrying free gold and sulphurets, assaying from $10 to $80 to the ton.——The Harriman shaft is 200 feet; new drifts will be opened north and south. Good prospects were met in sinking.——The Bonanza is unwatered to a depth on the incline of 1700 feet.——The Rappahannock is nearing the 1000-foot mark; when reached, crosscutting will be commenced.——The Rawhide is now the deepest mine on the lode.——The Trio continues sinking the north and south shafts. Good rock is found in both.——The McCann is a small mine, 400 feet long, but has a rich ore chute.——The cost of development, before any returns were received, of the Eagle-Shawmut, is said to have been over $100,000. The monthly profits now, however, are quite satisfactory.

NEVADA.

(Special Correspondence).—The sulphur deposit in this county is thirty-five miles northwest of Humboldt station, S. P. R. R., and consists of 480 acres, nearly all of which contains sulphur of high grade and fine quality. The property has been worked in the past in a slipshod manner, the local market consisting of 200 to 300 tons being supplied. Recently the property has passed into other hands and is to-day being worked on proper lines and large quantities produced. The crude runs from 80% to 95%, and when refined by the process now in operation at the mine a product is produced 99% fine and of a rich color. It is impossible to estimate with any degree of certainty the amount in tons of the deposit, but the present owners feel confident that they can extract within the next five years not less than 50,000 tons and then have plenty left in the mine.

Winnemucca, May 13th, '98.

The Wadsworth *Dispatch* says the weekly output of gold from Olinghouse Canyon is $500. A 7-foot vein of ore is said to have been developed in the Slip and another for 3 feet in the Hutchinson, the latter showing $60 in gold per ton.

The Summit mill at Pioche continues doing good work, but bad air in the mine limits the output of ore. An air shaft is being put down but a month will elapse before the tunnel can be reached.——The Elko *Press* reports the finding of high grade ore in the Gold Bug mine in Elko county.——Developments in the Star mine at Cherry creek are showing good bodies of ore. A mill with 150 tons a day capacity is to be erected on this property.——The Chainman Co., at Ely, made a shipment of gold cyanides last week.——The owners of the Jupiter mine from a test run made on 100 tons of ore, received an average of $11 a ton on the plates. The work of prospecting the ledge continues and there is a 3-foot face of ore in the drift.——The Delamar Lode says that shipments of high grade ore from the Magnolia mine in that district will be resumed at once. There is a large body of ore blocked out which averages $30 a ton, for the treatment of which a mill will be erected at a later day.——The Gold Crown mine near Aurum is providing some high grade ore.

Among the sales on the New York Mining Exchange last week, says the Salt Lake *Tri-*

bune, were 12,500 shares of Gold Creek of Nevada at 4 cents. This is the proposition that was swung by H. J. Mayham, assisted by Eastern promoters two years ago.

The Pioche *Record* notes a letter from J. E. Peck, Chicago, that he has come out winner in the litigation there, has disposed of a State right for the use of his concentrating plant, and will shortly return to Bullionville and complete his plant. He proposes to considerably enlarge the mill as at present laid out, since he is now able to do it, and to rush the work of concentrating the tailings, and thus make up for lost time in the past.

A sale of the Curieux group of mines at Mountain City will be made, it is locally reported, to C. D. Lane. The price agreed upon is $150,000. More than that amount of ore is said to be uncovered.——Increased activity is reported from many of the old camps; recent disclosures on the Penrod properties, near Elko, have created interest in the locality. The discovery consists of a streak of gold ore that looks as if the owner had a fair prospect. He has been working a small mill on fair ores for some time, and it is the intention now to increase its capacity.——At Ely energetic work is conducted by C. D. Lane, who is making a success of the Chainman, and who is tying up a number of properties in that camp. ——At Cherry Creek the Glasgow & Western E. Co. is operating with success. The same is the case in a number of other plants that have in late years been neglected.

OREGON.

A. A. Davis, near Jacksonville, has a promising ledge, and has sixty tons of ore on the dump ——E. Pierce has sold his interest in the Hamburg quartz ledge to Scott, Merrill & Co. The new proprietors expect to put up a mill soon.——The Barron & Shepherd, near Ashland, is hauling fifty tons of ore to the Ashland mill.——The Ashland-Mattern mine is running a full force and keeps its 10-stamp mill busy. —— The American Bar claim is yielding good returns, and work is prosecuted day and night with a force of thirty-eight men.——A ledge of copper ore has been discovered near Ashland.——La Bellevue mine, near Granite, started its fifty-ton concentrating plant last week.——The Union-Companion mine at Cornucopia is shipping four carloads a month of slimes and concentrates.

The Shasta *Courier* says the existence of an immense mineral lode, at a point on the Oregon side of the California and Oregon boundary line, near the summit of the Siskiyou mountain, has been known to Murray Bros. of Shasta, who also knew that the formation resembled, as far as investigated, the Iron Mountain mine. Recently the Murray Bros. located twelve claims on the Siskiyou mountain mineral outcrop. Associated with them are Sheriff Houston, Tillotson, Pryor and others. Assays of the ore taken from different locations show well in gold and copper.

In Elk creek the Pearl Mining Co. is increasing its force and will do considerable development work this summer. Daley & Potter are working their ledge, with fair prospects.——J. T. Cook of Missouri Flat, while removing some earth near his residence a short since, struck a ledge from which as high as $2.60 was obtained from a pan of dirt.——The Sterling Mining Co. is running its mill and a good-sized force day and night. As a comparatively small quantity of snow fell in the mountains last winter, the run will not be as long as usual.

WASHINGTON.

The San Poil, near Republic, is in ore averaging $60 per ton in gold in the 125-foot level. ——Good progress is made in the Admiral tunnel, and the indications are encouraging.—— Development work in the Butte and Boston is satisfactory.——Satisfactory progress is made in the North Star, Pittsburg, Jim Blaine and Republic No. 2.——Work on the Lost Lode has been resumed.——The Copper Butte Co. is running a tunnel on the Headlight, and the Cantonwine is sinking.——J. Cody has taken a bond on the Independent mine for $40,000, and is pushing development work.——Shinn & Hammond have found a ledge 14 feet wide, which they are developing. They have seven claims in the group.

At Republic the Golden Harvest group, comprising eight claims, was purchased by Spokane and Republic men. A large vein has been found on the property which gives general assay values of $18 in gold per ton.——At Colville the county assessor has assessed the Republic mine at $300,000. The Republic Co. asked that the property be listed at $250,000, while the county assessor insisted on a valuation of twice that amount. It was finally adreed that $300,000 would be a fair valuation, and these figures will stand for two years.

The sale of the Lost Lode mine at Eureka was made to Oliver and Schuster of Spokane, for $12,500. At Myers Falls, in the Black Jack claim, a ledge was discovered that assays $89 per ton.——E. S. Graham is pushing work on his claim with success.——W. K. White, owner of the Earthquake claim near Grand Forks, struck 3 feet of high grade ore. Samples show native copper.

The Senate bill to establish an assay office at Seattle was called up last Monday, the purpose of the bill was to afford a convenient office for the Klondike gold-producers, who will mine this year, it was estimated, from $12,000,000 to $20,000,000. The bill carries an appropriation of $20,000 for expenses of the office. It was passed.

BRITISH COLUMBIA.

It is locally stated that a Tacoma man will build two elevator dredgers at Quesnelle, Cariboo, as river dredging for gold on the Fraser seems at last to be making some success. The people of Cariboo believe that dredging their rich streams for gold should, if intelligently prosecuted, yield excellent returns. Acting on this belief Dr. Craighead is about to operate a dredger on Cottonwood creek.——The managing director at Golden River, Quesnelle, has been visiting the property, and in the course of his report he says: "Gold everywhere; success is now assured." The manager estimates a profit of $2325 a day by employing 300 men, and expects to do better later on.

The War Eagle at Rossland shipped 780 tons last week. Work is continued timbering the new shaft of the mine. The crosscut from the 625-foot level to the ledge continues.——Retimbering the 350-foot level in the vicinity of the recent cave-in continues successfully.—— At the Evening Star the ledge which was lost has been recovered.——In the Victory-Triumph a strike has been made of an ore body about 4 feet wide. Assays go from $18 to $32. —— The Rossland *Miner* says that thirty-two men at the Le Roi quit work because of an order calling for ten hours work in the shaft, instead of eight, as heretofore, without increase in the pay. The men had been getting $3.50 per day of eight hours and had been furnished with rubber coats and boots. The shaft is down 750 feet, and they were obliged to climb that distance twice daily, which also was a factor in their dissatisfaction.——The Slocan Star concentrator resumed operations for the season. The Star is employing a large force.——Fifteen hundred and fifty tons of ore went out of the Slocan last month.

The Lily May Co. at Rossland, at the meeting of its stockholders, ratified the sale of the property to the English company formed in London by H. White to operate a number of Rossland properties. The deal includes a cash payment of $50,000 and 10 per cent in the stock of the new company, which will be capitalized at £50,000. A part of the cash payment has already been made, and the balance is to be paid June 15th.——Work has begun on the Blackcock mine, near Ymir, with a force of twenty-five men.

R. H. Campbell hopes shortly to turn water on at the hydraulic elevator at the gold gravel mine at Harper's Camp, Cariboo. The Miocene shaft has reached 275 feet of depth without touching bedrock. Bedrock is, he believes, however, near at hand, and the shaft is now sunk in a promising body of gravel.

Rossland ore shipments last week were 2262 tons; for the same week last year 1240 tons; shipments since January 1, 1897, 100,203 tons. ——D. Goldberg sold to an Eastern company four properties near Trail for $15,000. Surface assays gave $150 in silver, $3.50 gold and 20 per cent lead.

ALASKA.

Several passengers returning from Copper river came to the conclusion that a glacier was no place for a white man to camp on. These men report from 5000 to 6000 people spread out from the beach to a few miles back. Several small discoveries of gold have been made, but nothing of any great importance.

Circle City, which was deserted during the Klondike rush, will come to the front again this year, says the Alaska *Miner*. Some remarkably good mines have been discovered on ground tributary to it, and for several years past a large amount of gold has been brought out of the country. The mouth of Birch creek is many miles from Circle City, but an easy portage of about fifteen miles brings one to the creek, which runs almost parallel to the Yukon river. There are a number of men who make a business of taking supplies across this portage, and during the winter months the trail is constantly occupied by men who take advantage of the snow to transport a large amount of supplies to satisfy the requirements of the miners at Birch creek. Mastodon and Deadwood creek diggings.

THE KLONDIKE.

As an outcome of permission given three weeks ago by the Gold Commissioner to prospect the present townsite of Dawson, gold has been found beneath the streets of Dawson running from good colors to 35 cents a pan. The formation exposed in a shaft sunk at Dawson shows that the present townsite was once a bar in the Yukon river.

Mail for all points on the Yukon river will be sent on June 10th and 25th by the carriers of P. C. Richardson of Seattle to whom the contract for this route was recently awarded, and also on those dates in July and August. Mail will be sent from San Francisco to Seattle, thence to St. Michael, and from there as far as Dawson, deliveries and collections being made at Circle City and other points on the way. Mail from Dyea, Skaguay and Juneau is sent every five days by way of Seattle.

IDAHO.

Secretary of the Interior Bliss has reversed the land office decision in the case of the Emma lode mining claim, covering lands in the Cœur d'Alene district. The lode claimants will not be obliged to make republication, but patent will issue to them upon presentation of the proper certificate of expenditure of the $500 required by law.

It is reported from Murray that the output of placer gold from the north end of the county will be larger this year than for several years and, with the development work of this year to guide them, the dredging company will still further increase it next year.——The Vestal Con. P. M. Co. is working as fast as water will allow. Their ground, judging from a recent partial cleanup, is the best they have worked for years. They took out thirty ounces coarse gold, several nuggets running over an ounce and one weighing an even $50. They are only running a day shift, the Lucky Dog. Co. using water from the same source at night. ——The Arizona Co. not only has plenty of water for their own use, but are selling some to the Nugget Co., which is working day and night. A number of properties are being worked by booming on Prichard creek, on Eagle and on Beaver as well.

At Bayhorse the Ramshorn and Skylark are each working a force of twelve men.——W. J. Treloar, who is operating the Democrat, is taking out some fair ore.——I. Christensen, in the Silver Brick, is doing development work. ——Chambers & Frazier have been running a tunnel in the North Star, but are now crosscutting toward a body of ore which is known to exist in the Silver Greek.

Avalanche: The mining situation was never more auspicious in Owyhee than now. The regular producers, Trade Dollar, Black Jack and DeLamar are on the increase, and new properties are more than meeting the expectations of the managers. The old Poorman has passed its dark days. The Cumberland is turning out ore and bullion; the water will at once be taken from the old Empire, and new work prosecuted; the South Central, which was closed last fall, will be started up; the Ontario is producing good ore; the Banner group will soon be working; good ore is being extracted at the Flint mines.——The Wagener arrastra at Silver City is grinding seven tons of ore daily from the Cumberland mine, and making satisfactory savings. A partial cleanup resulted in 350 pounds of dry amalgam.——The lessees on the Potosi have finished a satisfactory run of forty tons of ore and are taking out another lot. The ore is slightly refractory, but with the combination process and careful treatment they effected a saving of about 92 per cent of the assay value.——Pickering & Adams who have a lease on the Mary mine, will begin work at once.——It is reported that a good body of copper and silver ore has been opened in the Flint mines. The mill is running steadily. Two tons of concentrates and a ton of high grade ore were shipped recently.—— M. H. Jacob, representing an Eastern company will commence operations at the Empire mine soon.——During the past two years the Poorman has kept a small force on development work. The lattter work consists of a winze, sunk to a depth of 270 feet, with drifts at 50, 150 and 250 feet, these levels aggregating about 1150 feet. The general appearance of the mine is encouraging. The Poorman mill started last week. The mill is an electric-cyanide plant, and is connected with the mine by a Hallidie system bucket tram.——

W. Ottenbacker is developing a quartz claim near Idaho City. The ledge is 3 feet wide, and the ore milled $8 a ton.

UTAH.

In 1893 the Mercur district was treating 150 tons daily—the Mercur 100 tons and the Marion 50 tons. Now there are eight mills in the district, of capacities as below, and two more building: Golden Gate, 500 tons; Mercur, 325; Sacramento, 150; Northern Light, 300; La Cigale, 200; Geyser-Marion, 150; Sunshine, 100; Chloride Point, 100; total, 1825 tons. The Golden Gate has a capacity of 1000 tons daily and will soon be treating that amount. La Cigale, which has not begun operations on account of roasting facilities, has a capacity of 500 tons, and the same condition exists at the Sacramento. The Daisy and Overland mills, now building, will swell the total.——W. Vogel, Mgr. Silver King mine at Richfield, says that soon work will be commenced on a 10-stamp mill on the company's ground. The Silver King is one of the claims owned by the Deseret G. M. Co.

Mulrooney & Co. paid $30,000 for a half interest in the Bessardia and Dutch Empire claims at Mammoth. Prospect work will begin at once.——The ore output from the Central Eureka shows a fair percentage of copper.——The shaft on the Confidence mine, near State Line, has reached 120 feet on a vein of free-milling gold ore.——Brown & Higgs have secured a bond and lease on the Last Chance mine, near Lehi, for $30,000 and have begun work on the property.——Near El Monte, silver, copper and gold discoveries have been made and a town organized. The High Ore mine runs 19 per cent copper, $21 in gold and 1100 ounces silver per ton.——The Mercur Co. made its semi-monthly shipment of cyanides, aggregating 1000 pounds.——Sufficient money has been raised by the Anne M. Co. to complete the shaft to a depth of 500 feet, and work will be resumed at once.——A drift is being driven in ore in the Columbia, following a body of shipping ore, which runs from 40 to 50 per cent lead, 80 ounces silver and $2.30 gold. The vein is from 1½ to 2 feet in width.——Retimbering the Centennial-Eureka shaft at Eureka is completed, and shipments will be increased. The company has about 200 feet of stoping ground between the 950 and 1100 levels. The ore runs almost 20 per cent in copper, together with a fair value in gold.——The shipments from the Grand Central are kept to 1000 tons per month, and are divided between the silver-lead ores of the upper levels and the copper and gold from the ore body on the 700 level.——At the Horn Silver, near Frisco, 4000 tons a month are raised, of which 600 tons are marketed in crude form.——At the Washington, shipments have been temporarily suspended, although a good class of ore is being placed in the bins. The intention is to do a large amount of work on the property this season.——At the Galena, from which good ore was shipped last season, work has been temporarily suspended, because, as is stated, of a lack of money with which to proceed. The shaft has reached 200 feet, and shows a streak of ore running high in both silver and lead.——The South Swansea had six carloads of ore at the sampler and will follow with three more while no effort, said an officer in the company, is being made to tax its capacity.——In the Geyser-Marion a new ore body is reported that assays $4 per ton. The cost of extraction and treatment is calculated at $2 per ton.——Ore shipments from Silver City last week amounted to thirty-four carloads.——Work was resumed on the Deer Trail group at Marysvale.——Eight cars of silver and lead ore from the Niagara were shipped from Bingham.——Assays from the recent shipment from the Four Aces at Silver City show 49 per cent lead and 76 ounces silver.——The pumps at the Dalton & Lark, stopped a year ago because of the low prices of silver and lead, have been started. It is estimated that two weeks will be required to drain the mine.

The first shipment of ore from Alta for 1898 was sent out by the Darlington, amounting to sixty tons.——The Grizzly, which has made progress during the winter, will follow with 165 tons.——The City Rock, Tallejo and others will make their initial shipments; the whole reaching a total, perhaps, of 400 tons, that will net the owners, according to assays, about $30 a ton.——At the property of the Dexter M. Co. twenty stamps are dropping, and thirty will be dropping in a few days. The earnings of the Dexter last month amounted to $16,500.——The Mercur mill is crushing 325 tons a day when its ore bodies could be made to respond to a call for at least double that tonnage without effort.——The Sacramento is leaching the gold out of 150 tons a day, whereas it is capable of putting out as much more, while the same may be said of the Geyser-Marion.——It is said that the Goliath is crushing 400 tons daily.——At Tintic the Sioux-Ajax tunnel has reached 4261 feet, and while it is being driven forward to a connection with Sioux and Utah ground, some prospecting is to be done.——The Sioux plant is running on ores from Utah and a second-class lot from Lower Mammoth, while the stamps of the Mammoth are dropping on ores from its own property, which is supplying 175 tons a day.

Samuel Newhouse proposes to build a smelter at Salt Lake for Highland Boy ores from Bingham and a railroad thence to Salt Lake, all to be completed by Dec. 1st, '98.

At the Golden Gate, Mercur, it is reported two of the roasters are finished and in commission, one treating 175 tons daily, the other 75. Another two are about completed. Besides the 250 tons which daily go through the roasters, 250 tons of oxidized ore are being treated, bringing the output up to 500 tons a day at present. As soon as the roasters are all completed more arsenical and less oxidized ore will be treated.

A Green & Co., lessees of the Washington, broke into 2 feet of ore, which assays an average of 10 per cent copper.——There is some prospect that work will shortly resume on the Crown Point a copper property from which several shipments were made last year, and on which work was abandoned on account of water.——The Phœnix has resumed work and is in a big body of ore which will furnish business for the new concentrator, besides yielding good tonnage of first-class for shipment. ——The Montezuma made a thirty-ton shipment of first-class ore.——The 150-foot level of the Starlus is in 55 feet and is being pushed; a little water was encountered, but not sufficient to impede work. The face of the drift is in low-grade ore.——The Swan-Bemis concentrator is approaching completion. The plant will be ready to run by the 1st. It will begin with a number of contracts.——The Last Chance Co. are said to have struck a good grade of ore in the Hooper mine.——H. Joseph, interested in the Markham group, says the project to run a deep tunnel to tap that and other properties is now abandoned, and that a beginning may be made this fall.

MONTANA.

In his report of Montana mines for '97, speaking of Lewis and Clarke Co., E. B. Braden says:

The largest property in the county is that of the Montana M. Co., Ltd., at Marysville, the most important gold mine in the State. The development consists of eight miles of tunnels and entrances at the various levels. A depth of 1600 feet has been reached. The ore is free milling; the work employs 250 men.

During the summer of 1897 the Montana Co. erected a 400-ton cyanide plant three miles from Marysville, to work the tailings from their mills that had been recovered in settling dams, six miles below Marysville, two and one-half miles below the cyanide plant. A narrow-gauge railroad was built to connect the two. These tailings are prepared uniformly for treatment at the dam by plowing, harrowing and continuous working to pulverize the slime lumps. The material is then loaded into cars of three tons capacity each and are then delivered to the mill. This mill is the largest in Montana working by the cyanide process.

The tailings after leaving the cars pass in an almost continual stream to the sheet iron lining of the bins and out of the gates to a 24-inch four-ply belt conveyor, which conducts them to a revolving chute or distributor; and this in turn fills a vat 38 feet in diameter by 9 feet deep with 400 tons of tailings in about eight hours. The great advantage of filling a tank in this way is that it gives a charge of more uniform permeability than any other method.

There are four of these tailing vats, each with its bin, conveyor and distributor, and one is charged daily, thus giving four days to complete the treatment of each charge, which consists in saturation, lixiviation, washing and discharging. The latter is accomplished by sluicing with 2½-inch hose, the water being under a 60-foot head, through four side discharge doors and one bottom discharge gate in the center of the vat. By this method 400 tons are discharged in three hours or less at a total cost of less than 2 cents per ton.

The solution tanks are ten in number and consist of four precipitating tanks of California redwood, 22 feet in diameter by 14 feet 9 inches deep, and two storage or supply tanks, 38 feet in diameter by 9 feet deep. There are also two water tanks, 22 feet by 14 feet 9 inches, for the storage of 80,000 gallons of water.

The tailings are the lowest grade in gold of any now worked in this country, containing copper carbonates and sulphide tetrahedites, arsenical polybasite and ruby silver. The plant operates under very unfavorable climatic conditions, being in the most northern latitude of any known, but in October and November it exceeded the predictions of profit by nearly 50 per cent, and netted about double the return the company considered would justify the erection of the plant.

It is understood that the Boston & Montana is charging to the expense account and not to construction all the extensions and improvements at the Great Falls smelter, which ex-

tensions are being made with a view of increasing the output of copper from 60,000,000 to 90,000,000 pounds per annum. This will permit the treating of 1200 tons of rock per day instead of 800 tons as at present.

At Neihart, J. Hegener shipped three tons of ore that yielded eighty-nine ounces silver and $1.90 gold per ton. — Fitzsimmons & Co. shipped a carload of ore that yielded good returns.

Beager & Presley are developing a property near Libby. They have four claims. On one claim they have a vein 34 feet wide of good grade.——The *Inter Mountain* says that the Parrot Co. has broken the record in Butte in developing the shaft on the Bellona claim. The first 100 feet was completed in 28½ days. Only twelve men had been employed, three shifts of four men each. The shaft is three compartments of the usual size. ——H Eppel has leased the Deep Gulch placer at Garnet and will put a force to work.

Murphy Bros. struck a good vein on their property at Hassel.——The New Era Co. is milling a lot of second-class ore ——H. Kallis shipped five tons of ore from the McKinley mine to the smelter.——Lethlean & Cavanaugh started work on the John L.——Herbold & Cooper shipped a carload of high grade ore to the smelter from the Ontario mine.

The Rose mine at Basin is shipping good ore.——H. Anderson of Sheridan shipped 330 sacks of gold ore from the Union mine.——A. E. Gade sold a group of mines for $10,000 to H. A. Hull & Co., who will begin development work immediately.——Jennings & Steele, on the Whippoorwill at Neihart, have loaded twenty-five tons. The ore is rich in copper, besides lead and silver.——H. McConville, on the Pasadena mine near Clancy, took $800 from 40 feet of development shaft.——The car of ore shipped from the Mocking Bird, consisting of 37,900 pounds, netted $483 84.

The Montana O. P. Co., in addition to operating the Rarus mine, is developing the Big Bonanza near Walkerville; the Cora, on which a shaft is being sunk, and the Nippur mine, one of the oldest in the camp, from which frequent shipments of ore are being made. The same company is also developing a number of promising properties in British Columbia.——Glora & Mills shipped ore from the Ohio mine, in Jefferson county, that runs nearly six ounces in gold.——A three-compartment shaft is being made from the 350 level in the Michael Devitt to the surface, through which not only the Devitt will be worked but the Never Despair, will also be explored.——It is said that work is to be resumed on the Bimetallic-Granite Mountain combined properties at once. There is some talk of an electric plant being put up to supply power and light.——H. J. Reiling bought 500 acres of placer ground near Salmon City for $175,000. He will build a dredge this summer.——The Judge mine, near Castle, has 700 tons of ore ready for shipment.

WYOMING.

Near Evanston Maj. Glafcke begins development work on a large body of low-grade ore, the average assay of which is $8 per ton.

SOUTH DAKOTA.

The Highland Chief G. M. Co. will start their mill on the Champion mine, near Deadwood soon. There is a small force taking out ore. The ore body is large and, while it is not all high grade, much runs above the average

COLORADO.

The English owners of the Caledonia, near Cripple Creek, have not given up hope of developing the property into a pay proposition. They have expended in the neighborhood of $125,000 on the purchase of the claim and in development work. A contract was let to sink a new vertical shaft to a depth of 500 feet. It is to be 4½x9 feet in the clear.——Assays on samples from across the 8-foot body of ore in the Fluorine gave $58 and $76 a ton as averages. —— Murray & McCormick, on their lease on the Ingham, made a two-carload shipment that will average $50 per ton.——Last month the output of the Fluorine was 270 tons, which averaged $47.35, or a total of $12,842 03. The lowest lot sent out during the month yielded $30 and the highest $72.20 per ton. Up to the 1st of May there has been between $53,000 and $54,000 worth of ore marketed from the mine.——McCormack & Co. made a fifty-ton shipment of low grade ore from the Lindsay block.——The Grace Dollar Co. is averaging 200 tons a month from the new chute opened in making the connection from the new to the old shaft. The ore is of good grade.——A strike has been made on the Nellie V., owned by the Lexington Co., at a depth of 85 feet. One foot of quartz assays from $40 to $60 per ton.——The King Solomon M. Co. owns about 1000 acres of rich mineral land near Frisco, in addition to large tracts of mineral land in Park and El Paso counties; they will do extensive development work this summer. On Ruby mountain this same company is developing a body of mill ore a mile long, and over 20 feet wide, which runs from $5 to $10 per ton gold.——The present output of Robinson, Kokomo and Frisco camps is over 200 tons of smelting a day, and as soon as the roads get passable it will be increased to 400 tons.

The Gold Sovereign is shipping high grade mineral from four shafts. A seven-carload shipment was made that went $70 for the low grade and $136 for the first grade.——Some rich ore is being mined on the Garfield Con. There is a seam of ore from 1 to 3 inches wide. The property is producing at the rate of $1000 per day.——The Johnstone lease on the Republic is producing from $1200 to $1600 a day, the shipments averaging twenty tons and the ore running from three to four ounces.——Hoffman & Co. have been sending out a carload of ore a day from their lease on the Zeolite.——The heaviest shipments have been made the past week in Georgetown made for months. As spring advances each month shows an advance over the previous one in the amount of business transacted.——The Pederson mine, near Central City, is making daily shipments of about forty tons, and the ore is of a fair grade. A body of high grade ore has been opened in Lucky Guss, Cripple Creek, at 650 feet depth. About three wagonloads have been sacked since it was opened. Since the company turned it over to its employes to allow them on a leasing basis to get out their back wages, the twenty-seven men have earned from $7.35 to $7.85 each a day. They have had it on these terms for three months, and have an additional holding for three months.——Returns for the last shipment from the Pharmacist contained about eight tons and averaged $440 per ton.——The Victor is now producing about 100 tons per day. This mine could output 200 tons per day for months, but it is impossible on account of the condition of the roads to secure teams to transfer it to Goldfield. The Belt line track will not be laid to the camp much before the first of next month. Sinking below the 600-foot is in progress.—— The Strong continues to output from 75 to 100 tons per day. About four-fifths is sent to the chlorination mill and averages better than two ounces. The smelting ore runs from six to eight ounces.——A three-carload shipment to the smelter from the Granite was the first lot sent out for some time. The work of crosscutting for the vein is under way at the 700-foot level.——The Mary Alice is being operated by the San Antonio Co. under a $100,000 bond, which does not fall due for nearly twenty months. G. S. Fleming, Pittsburg, is president of the company. There is plenty of money in the treasury and a contract was let a few days ago to sink the two-compartment shaft to a depth of 400 feet. It is down 192 feet.——Shipments from the Jones shaft of the Pharmacist have been resumed. Four cars of ore—one of five-ounce smelter and three of good grade mill dirt—were made, and with them went sixty sacks of the stuff from the recovered chute from which heavy production was made from the 400-foot level.——The complete April returns from the Hull City placer show gross value of ore $38,636.35, the net smelter returns $29,123.96. This property is being worked by lessees and the royalties received by the company during April amounted to $7087.78. The royalties received in March amounted to $5621.37.

Another shipper has been opened in the zone extending from the Hull City placer, near Victor, making the fifth producing shaft of the Vindicator property.——Keith & Grube of the Wallace, in a crosscut at 125 feet depth, opened 3 feet of ore that assays $40.——A mill-run from the Frostburg mine, near Georgetown, returned 264 ounces silver to the ton. Over $700 was taken out in sinking the shaft 20 feet.——The Annetta M. & M. Co., operating the Griffith mine for the past year, took up their bond; the deeds call for $30,000. The company expended a large amount of money in putting a raise through from the tunnel to the upper workings, and opened one of the largest chimneys of ore ever found in the county. —— The Keystone, near Cripple Creek, made a good strike which was found by poor sub-lessees. There is 4 feet of ore that assays as high as $500 per ton. The entire body averages $150 per ton.——Jennings Bros. & Kerr are in good ore in their lease on the Lillian Leland. In the breast of the north drift the vein is 3 feet wide. From 2 to 3 inches of the vein filling is high-grade ore that assays from $1000 to $2000 to the ton. Alongside this there is 12 inches of quartz good for from three to four ounces. The last shipment of the high grade went a little less than $800 per ton.——Foley & King are averaging ten tons of mill ore a day from their block lease from the seventh level of the Los Angeles. There is a number of lessees working on the property, which is making a production of close to 500 tons a month.——Production from the Gold Coin is running at thirteen tons a day. The chute in the bottom has been drifted on for 350 feet. The hanging wall of the vein has not yet been reached. The distance between the walls at the 400-foot depth is 30 feet.——The Portland is keeping up its output of seventy-five tons a day, almost entirely from the chute toward the Independence end line, worked through the 700 and 800 foot levels. The ore in the Hidden Treasure is being taken out only in development and no shipment of this will be made until the mine meets with some accident or some unforeseen contingency arises to check production from the other parts of the mine—at least, this is the last plan announced by the company. Between twenty-five and thirty tons of the high-grade stuff is stored in the bins under ground.——The Ingham was closed on orders from the Colorado Springs office. Under a former management, this property in seven months netted $51,000.——Sigsbee & Co., sub-leasing on the Keystone, have reopened in the 80-foot level the chute from which Fogleman & Smith made heavy production a year ago. They found 4 feet of ore that assays from $46 to $580 a ton.——The new compressor of the Orphan Belle is in operation and production has been restored to the daily average of thirty tons. A large amount of development work is being done on the property.——A seven-acre fraction near Victor was sold to W. Hayns of Ypsilanti, Mich., for $15,000, the sellers being a number of miners who have owned the claim for a long time. Since the Woods Investment Co. purchased the Uinta tunnel and the Big Banta group for the Battle Mountain Con. Co., Mayor Doyle has given an option on the stock interest which he retained as one of the provisions of that transaction. The consideration involved is large, as Mr. Doyle is said to be the owner of 200,000 shares of the Uinta stock.——The management of the Blue Bird has decided to develop that property on the co-operative plan. They propose to give 300 miners an opportunity to work the property with them. The company is to supply powder, tools, etc. The Blue Bird is equipped with a plant of machinery, and is said to have good ore in all the levels. The present output of the mine averages a carload of ore daily. A three-car shipment was sent out which is expected to return $70 per ton.

Lessees on the Mollie Kathleen at Cripple Creek are again in good ore, the 12-inch streak in the 60-foot level averaging $50 per ton without assorting.——The Hidden Treasure has sacked forty tons of very high grade from the rich strike on the 700-foot level. On the 800 level the ore body is larger and richer than above. A good ore reserve is being maintained and the output is kept up only to the amount of the expense account and the $45,000 monthly dividend. —— One hundred feet greater depth is to be given the Nellie V. The rich streak of $356 a ton ore continues small at present depth.——The Dead Pine, Granite and Last Dollar are sacking ore ready for shipment as soon as the Golden Circle road reaches the Victor. The Victor has 150 tons for shipment.——Good ore is again being taken out by the lessees on the C. C. Con. properties. The ore runs from $50 up.—Work has resumed on the Red Cloud at Whitehorn, from which a mill run was shipped that netted $22 per ton.——The Prairie shipped two carloads of ore which according to assay tests ranges from $50 to $100 in gold per ton.—The Chance is again at work. Two veins 15 feet apart were opened. The wider vein is 9 feet and averages $5 in gold. The other vein is but 2 feet wide, but runs $33 in gold per ton.——Commissioner of Mines Lee in his report for the mineral production of Colorado for 1897 presents the following summary: Gold, 947,-249 ounces, $19,579,636 83; silver, 21,278,202 ounces, $12,692,447.47; copper, 9,151,592 pounds, $960,917.13; Lead, 80,799,778 pounds, $2,731,-032.48; total; $35,964,033.92.——While the experts are preparing for the litigation between it and the Portland, the Strong continues its daily output at from sixty to seventy tons a day, about two-thirds going to the mills and one-third to the smelter. For the past three weeks a number of experts have been making examinations of the Portland and the Strong underground workings, and it is understood that both sides are now ready for the suit.

The greatest depth reached on the Silver Ledge mine, near Ouray, is 400 feet. There is ore blocked out nearly all the way bearing gold, silver, lead and zinc. The property has a mill of fifty tons capacity which the management contemplates enlarging. The property is owned by Denver men.——The Mildrum tunnel is being pushed from the Ironton end as fast as it is possible in the formation, the men working at a disadvantage in the slide rock. As soon as a solid formation is met, which is expected about the end of the present month, air drills will be installed and the work pushed to completion.——The Congress mine is a steady shipper. The principal value in the ore is the copper, although gold and silver are found.——L. R. Frye will start the Saratoga and will have a small force at work by the 15th.——The American Nettie and O. & N. are sending regular shipments of high-grade ore.——The Black Girl is being worked under bond by Du Praw and Hagerty. They are making steady shipments.——Senator Newman will soon put a considerable force at work on a group near Ironton, which has been secured by him for an Eastern company. The group comprises the Baltic and Mono, J. I. C. group of five claims, the Maud S. and the Brooklyn. These mines constitute the largest area of pyritic ores in this section, and all carry copper-bearing ore, besides values in gold, silver and lead. When shipments of high-grade ore were made from this group in the past the low-grade ores could not be handled with profit. These will now be transported to the smelter for treatment.——Thirty-five men were put to work at the Virginius mine on May 1st, and it is expected that the management will increase this force to 100 by June 1st.——Eight inches of $1000 ore is reported from the fifth level of the Garfield Con. at Cripple Creek.——Up to date Rico mines have shipped 310 cars of ore since January 1, 1898. The gain over last year is about 155 carloads.——The Dolores river placers are being sunk to bedrock and extensive work is laid out for the season.——The Battle Mountain mines of Eagle county shipped 11,380 tons of ore since January 1st. The Black Iron and Belden mines are the principal shippers, having shipped nearly 3000 tons.——The First Chance Con. has given a three years' lease at 15 per cent royalty. It has a plant of machinery and work will commence immediately.——The St. Louis-Gunnell mine, Clear Creek, is keeping two 5-stamp mills busy on ore from the property.——The Pittsburg is steadily shipping with good results.——In the Pay Rock a 10-inch streak of smelting ore has been struck which gives $319.18 a ton, over half of which is in gold.

The output of the Pride of the West mine, near Silverton, will be twenty tons daily.——The Aspen is shipping eight carloads per month.——The Lady Ellen mine has four carloads of high grade ore ready for shipment. The Gold Crown mine has a 350-foot tunnel, which cuts three parallel veins containing iron ore that averages from $5 to $9 per ton gold. The property has another small vein that carries 1½ ounces gold per ton.——Fifteen men are at work on the Ridgeway mine.——The Sampler is handling sixty tons of ore daily.——Paine Bros. are packing twenty-five tons of ore daily from the Black Diamond mine.——The Temptation mine is being rapidly developed. Capt. Freeman, the owner, contemplates the construction of a mill during the summer.——The Congress mine has been a heavy shipper all winter. Its ore body is 30 to 40 feet wide. The Congress ore is a copper product running, it is said, over 23 per cent.

Record: The new placer operations in the Swan and Blue River valleys during the season will be on a larger scale than any work of the kind in the Breckenridge gold belt. It has been ascertained by means of bedrock shafts, some five or six having been sunk, that the nugget-bearing stratum of the alluvium of these streams is unusually rich in coarse gold.——The North American G. D. Co., which is operating the consolidated placers of the Swan River valley, has started dredge No. 1 to work; No. 2 will probably be ready for work by June 1st. The dredging plants are complete and include the pumps for use when the bedrock is to be cleaned up. The plants are to be operated day and night during the season; the boats are supplied with electric lights and will be connected by telephone with the manager's residence. The lower portion of the placer will be worked with giants and hydraulic lifts.——The Pence-Miller Placer M. Co. is working seventy men on the new ditch, which they hope to complete within thirty days. The ditch will deliver water with a head of nearly 240 feet. It is believed to be from 40 to 50 feet to bedrock at the place selected to begin operations.

NEW MEXICO.

The shaft of the Dixie at Organ is down 200 feet.——Good ore is being taken from the Gold Standard mine at Golden.——A body of ore has been struck in the Klondike mine at Organ.——Eight men are developing the Benton mine at Dolores. A shipment of twenty tons of ore was made.——At Pinos Alton six quartz mills are running.——J. B. Mayo is shipping ore from the Old Reliable M. Co.'s property to Golden.——The North Homestake mine at White Oaks will resume work.

G. A. Bennett is shipping high grade galena from his claims at Organ.——The output from the Hillsboro mines since January is 3030 tons.——The Stella mine at Red River has several thousand tons of ore on the dump running $27 per ton. It is said the owners contemplate building a mill.

C. F. Easley made final entry and purchase at the U. S. land office in Santa Fe of the Albemarle, Huron, Ontario and Pimlico mining claims, comprising the Albemarle group, in the Cochiti district, for T. Lowthian and others. The group consists of seventy-eight acres of mineral land and is under bond to O. P. Posey et al.

ARIZONA.

J. A. Fleming, Pres. Black Warrior Copper Co., has men employed taking out ore to be smelted at the United Globe smelter. There will be about 700 tons of ore to be moved.——A conservative estimate places the copper output of Arizona at 5000 tons per month.——Doran & Blaufeldt have taken a bond on the Accidental mine, near Prescott, which has been abandoned many years. They will sink 300 feet, run levels and thoroughly explore the property.

At the Norma and Occident of the White Hills M. Co.'s group, in Mohave county, ore is being taken out which carries 450 ounces of silver per ton. Only twenty of the fifty stamps are running owing to the scarcity of water.——The ore from the Longfellow mine, near Prescott, gives an assay value of $56 in gold per ton.——The gold in the Relief mine, near Phœnix, is found in granite. The vein is irregular and rich and large enough to pay well.——Mohave county has three new 10-stamp mills working on ore from the Klondike, Sheep Trail and O. K. mines.——J. Roberts has an 18-inch ledge on his Ida May mine, in Yavapai county, which goes $30 per ton in gold.——At the mines of the Santa Maria G. Co., in Yavapai county, thousands of dollars have been invested in the erection of a cyanide plant, the building of roads and the opening of the mines. The principal mines are the Waters and the Standard. In the former a large body of high-grade ore has been struck and a contract has been let to sink 600 feet on the property. In a few days the stamps will begin dropping on a 10,000-ton test run of Standard ore.——The dividends paid by the Homestake mine for 1897 are said to be $437,000, an increase over 1896 of $92,000. The average grade of ore yielded less than $4 a ton.——The Saginaw M. Co. has taken a working bond on the Twin Buttes mines, price $60,000, of which $3000 was paid down. The company also pays $2 royalty on all ore extracted and reduced. The Twin Buttes mines are copper properties.——The Copper Queen Co. at Bisbee is shipping a carload of copper matte to Agua Caliente daily. This matte is used by the company there as a flux, it being about 45 per cent copper. These shipments average about 50,000 pounds.

The shaft of the Elkhart, at Chloride, is down 304 feet, and the third station is being cut.——It is reported that some of the high grade copper ore at Bisbee runs 79.4 per cent in copper, 135 ounces silver and a few dollars in gold to the ton.——Six 200-pound bars of bullion departed for the San Francisco mint from Williams—the product of the White Hills Co.'s mines.——A new chute of ore has been struck in the Altata mine of high grade.——The Morris Bros., at Polomas, discovered ore in their property, of which three assays resulted in $16, $60 and $110 per ton.——The

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Security Development Co. will erect a matting furnace at Chloride to handle the ores from the Elkhart mine.——The Decatur Copper Co. of Decatur, Ill., is pushing development work on its property near Jerome. Mr. Mullarkey, lately appointed Supt., has assumed charge. The work being done is sinking a shaft a depth of 200 feet.——The News mine, near Phœnix, is showing up well. At 65 feet a crosscut shows 20 feet of mineralized slate. There are twenty tons of ore on the dump.

The contractors having in charge the building of the railroad from Geronimo to Globe, find that the difficult point of construction is is at the Gila river across which a bridge of 900 feet must be thrown possibly over quicksands. The smelters at the Old Dominion mine may not be started until the fall.——The Juniper mine of Don Dabezas, Cochise county, is reported sold to R. A. F. Penrose for $75,000.

AUSTRALIA.

At the Broken Hill Proprietary 25,019 tons of ore were treated for the four weeks ending April 28, including product from ores purchased, and the output from the refinery was 487,155 ounces of silver, 2390 tons of lead, and fifty-seven tons of antimonial lead, the copper matter containing twenty-two tons of copper and 22,304 ounces of silver.

C. Y. O'Connor, engineer-in-chief of western Australia, has returns showing that the population of the Coolgardie gold fields, not including outlying districts, is 37,560, who pay £835 a day for the water they consume, the miners pay another £290 a day similarly, a total of £410,-625. When the water supply scheme is carried out the same quantity of water—about 50,000,000 gallons per annum—will be supplied at a cost of about £10,000 per annum ! The new scheme (editorially described herein in the issue of March 12, '98), will provide 1,800,000,000 gallons a year, at a cost of £320,000.

MEXICO.

The Compania Minera Expl. has been organized to develop a property at El Oro. R. E. King is Pres. and L. C. Camargo Sec. The capital is $200,000.

The Rincon y Anexas mines of Temescaltepcas are erecting pumping machinery, with a capacity of 700 gallons per minute, to be operated by heated compressed air. Flumes and ditch have been constructed to deliver 400 H. P. at the mine.——At El Truinfor the Progresso M. Co. is employing 1500 men.——S. Katzenstein is operating a copper property in the same neighborhood on a large scale.——The Railroad mine, near Alamos, Sonora, is shipping from $10,000 to $20,000 gold bullion a month.——Near Jupicari the Esperanza Co., a Kansas City corporation, is opening extensive placer ground. The company is organized with a capital of $600,000.——W. S. Morrow has begun development work near Minas Prietas. On one of the properties some work has been done that shows 30 feet of $10 ore. Requisite machinery will be placed as soon as the mines are sufficiently developed to produce 300 tons of ore daily.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DENTAL IMPRESSION MATERIAL. — Louis White, San Francisco, Cal. No. 603,803. Dated May 10, 1898. This invention relates to an improvement in the formation of dental matrices. It consists, essentially, in the employment of a suitable plastic material so prepared that it may be employed for forming an accurate mold of the cusps or the surfaces of the teeth and other adjacent parts. Said mold to be afterwards filled with plaster of paris; and from the facsimile thus produced teeth can be made and fitted in any usual or well known manner.

HAY-COCKING MACHINES.—William H. Frazine, Montpellier, Cal. No. 603,816. Dated May 10, 1898. This invention relates to an apparatus which is especially designed for cocking hay after it has been cut in the field. It consists of an attachment to the mowing machine of a horizontally traveling carrying belt upon which the cut grass is received, an inclined elevating belt running essentially at right angles therewith, by which the hay is carried upward, a basket suspended upon trunnion shaft and in such a manner that the hay will be delivered into it until the basket is filled; a means for revolving the basket when full so as to discharge the hay in a cock or bunch upon the ground, after which the basket is again returned to its normal position to receive another load. The basket has a movable side, so arranged that the bottom is allowed to swing inwardly about a hinged support, and the weight acts to help discharge the grass from the basket when the latter is inverted.

Personal.

W. F. DETERT, Supt. Zeila mine, Jackson, Cal., is in San Francisco.

E. M. MAHILL takes charge of a mine at Teozintlan, Puebla, Mexico.

F. ROBBINS has been appointed Supt. Lone Pine mine, Republic, Wash.

V. B. DE LASHMUTT becomes Supt. Eureka Queen mine, Republic, Wash.

COLORADO'S STATE GEOLOGIST, T. A. Rickard, is visiting San Francisco.

W. C. RALSTON, San Francisco, is at the Ralston mine, Placer Co., Cal.

J. WATSON, Supt. Norambagua mine, Grass Valley, Cal., is in San Francisco.

F. J. MARTIN, Supt. La Fortuna mine, Yuma, Ariz., is in San Francisco.

F. W. PAGE has resigned Gen. Mgr. Pennsylvania mine, Brown's Valley, Cal.

C. E. STEVENS is the newly elected Mgr. of the Hercules G. M. Co., Victor, Colo.

W. H. CLEARY JR., Supt. Petticoat mine, Railroad Flat, Cal., is in San Francisco.

J. DAGGETT, San Francisco, is examining his mining properties at Georgetown, Cal.

R. C. CHAMBERS, Gen. Mgr. Ontario mine, Park City, Utah, has returned home from the Slocan.

SUPT. ROSS of the Wildman-Mahoney mine, Sutter Creek, Cal., has returned home from the East.

J. J. LEVENTON, owner Leventon mine, Fairplay, Cal., has returned home from San Francisco.

I. L. MOORE, Supt. Lucky Marion M. Co., Greenwood, Cal., has returned to the mine from St. Louis.

D. KIETH, Mgr. Silver King mine, Park City, Utah, is visiting his mining properties at Baker City, Or.

C. MULKEY, managing owner Spreckels-Mulkey mine, Fairplay, Cal., leaves for Kotzebue sound next Monday.

J. H. WEDDLE of the Con. Kansas City Smelting and Refining Co. has returned to Leadville, Colo., from a sojourn in Cala.

M. B. KERR left San Francisco last Thursday on a two months' professional visit to Costa Rica. He will return via Washington, D. C.

CHAS. D. LANE and a party of gold miners left San Francisco on the 15th, outfitted for a two years' expedition to Kotzebue sound, Alaska.

R. T. BAYLISS, formerly Mgr. Montana M. Co., now succeeds Hamilton Smith as one of the managing directors of the Exploration Co. of London.

HUBERT VISSCHER of the U. S. Debris Commission has men digging holes in the channel of the Yuba, Cal., river one mile from Timbuctoo, to determine the depth and deduce data for a draft of restraining wall foundation at that point.

CAPT. J. F. PRATT of the U. S. Geological Survey is in San Francisco arranging for transportation and supplies for his Yukon river exploration party. He will survey the Yukon river this summer. Congress has appropriated $10,000 for the work.

THE Butte County, Cal., Miners' Association has elected delegates as follows to attend the International Mining Congress which is to be held in Salt Lake City on the 7th, 8th and 9th of July: A. W. Gassaway, Supt. Magalia mine; G. H. Evans, Supt. Banner mine; E. Murray, Supt. Enterprise mines; E. W. Duncan Sr. and A. Ekman, of Oroville.

J. H. NEFF, Pres. Cal. State Miners' Association, is in San Francisco selecting delegates to the Salt Lake Mining Congress. On Thursday he appointed the following-named as delegates to the International Mining Congress, to be held in Salt Lake City on the 6th, 7th, 8th and 9th of July, 1898: C. W. Cross, Col. W. S. Keys, M. W. Mather, H. E. Pickett, Tirey L. Ford, Robert McMurry, W. C. Ralston, A. Caminetti, Col. George Stone, E. H. Chapman, Wm. Irelan.

Coast Industrial Notes.

—The value of the fishery product of the Province of British Columbia in 1897 was $5,-834,764.90.

—Tucson has voted $100,000 bonds for water works, the third Arizona town which has voted water works bonds in '98.

—The B. C. Legislature has passed a bill forbidding the employment of Chinese and Japanese on all works carried on under a provincial charter.

—The domestic shipments of redwood from Humboldt, Mendocino and Del Norte counties, Cal., during April were 12,789 M. feet; foreign shipments, 1002 M. feet.

—The Pacific Rolling Mills announce a closing up and retirement from business. There are outstanding claims aggregating $800,000, the greater part of which in time may be liquidated.

—The Astoria, Or., & Columbia River railroad was opened for traffic on the 16th. The new line connects with the Northern Pacific at Goble and with the Southern Pacific and O. R. & N. Co. at Portland.

—In consequence of the drouth the loss to California in the value of its wheat crop will amount to $15,000,000. The loss to the fruit crop is estimated at $5,000,000 and that to sheep and cattle at another $5,000,000.

—A furniture car made by the N. P. Ry. Co. at its shops in South Tacoma, Wash., will be placed on exhibition in Omaha, as an advertisement of coast lumber. It is 42 feet in length, capacity 70,000 pounds, finished in oil. The car is built of fir, cedar, spruce, and oak in door frames.

—The Pacific Coast Elevator Co.'s entire system of warehouses and elevators in Oregon, Washington and Idaho has passed out of the control of F. H. Peavy & Co. of Minneapolis and is now the property of T. Wilcox and W. M. and C. E. Ladd of Portland. In the three States there are seventy warehouses and elevators, and the entire plant has a capacity of about 5,000,000 bushels of wheat. The consideration is understood to have been $1,000,000.

—President Ripley of the Santa Fe railroad denies that the line of steamships which it is proposed to run between San Diego and Yokohama is operated by his railroad company, but admits that negotiations have been concluded for a traffic contract with the railroad. Steamship lines are not run because Tacoma, Portland, Victoria and San Diego have better harbors, or are more convenient than San Francisco, but only because certain transcontinental railroads have their termini in these places. The Oakland *Enquirer* thinks that these railroads, which have been shut out of San Francisco by the exclusive policy of the Southern Pacific Co., are now taking their revenge.

—A letter from Ecuador says: "As to lumber, I doubt if there is a modern sawmill or planing establishment in the country. Such boards as I have seen made have been sawed out by hand from the logs, one man standing on top of the log and pulling the saw, while another below furnishes the force for the downward strokes. The most of the lumber used on the coast and on this river is brought from Oregon and Puget sound, and it often sells as high as 10 cents a foot. Georgia pine is brought around Cape Horn, a distance, I judge, of about 8000 miles. All imported lumber pays a duty of about 1 cent for every eight pounds, and in addition to this one of 30 per cent ad valorem."

—Consul McCunn of Dunfermline, Scotland, writes: "I deem it of sufficient importance to report that California barley received in this consulate is considered of an excellent quality; the malting capabilities are perfect. The preference here for California barley is so marked that it is said a reduction in the price of Scotch barley is sure to follow. American flour, though, is looked upon with suspicion, owing to the fact that it is believed to be mixed with corn, ground exceedingly fine. I have it from unquestionable authority that four out of nine samples of American flour tested within the past three weeks are alleged to contain 10 per cent of corn flour. The high price of wheat and the low price of corn are believed to have led unscrupulous millers to adulterate their flour in this manner. If this adulteration is not speedily checked, it will expose the American flour trade to great danger, the effects of which will be far reaching."

The State Mining Bureau of California has issued the following statistics of petroleum production in southern California during the year 1897:

Los Angeles County.	*Barrels.*
City of Los Angeles	1,073,011
P. C. O. oil, Newhall	145,000
Puente	95,000
Central Oil Co., Whittier	14,000
Santa Fe Railroad wells	12,000
Total Los Angeles County	1,339,011
Ventura County	368,228
Santa Barbara County	130,136
Total Southern California	1,837,429

The output of the Coalinga field, Fresno county, for 1897 is said to be 70,000 barrels. Adding to this the output of the Moody Gulch wells in Santa Clara (about 50,000 barrels) brings the total output of petroleum in California for 1897 to nearly 2,000,000 barrels, an increase of about 750,000 barrels over 1896.

Telegraphy in War.

The battle of Manila offers an illustration of the wisdom of having experts in telegraphy and electrical engineering attached to every army or fleet. It ought not to have been necessary to keep the world so long in ignorance of what Commodore Dewey had actually accomplished. If the electrical end of his establishment had been cared for as scrupulously as its strictly fighting end, he could have made his victory even more complete in its moral effect by showing the Spaniards the hopelessness of a war against so ingenious a people as ours. It should be the care of every commander of an army or a fleet to have with him a small corps of men who not only understand the working of the telegraph key and read messages by sound, but are shrewd enough to do a thousand things in the way of repairing and emergency work which may be called for when no outside aid can be procured. These men should understand splicing wire and cable in any condition and amid any surroundings. They should be of trained ingenuity in running down and locating breaks in the connection. They should have enough sobriety of judgment to be able to play the censor if necessary on dispatches put into their hands to send. They should be telegraphic geographers, as well as everything else, having at their fingers' ends the directions and junctions of telegraph lines all over the earth, for it sometimes becomes of the very first importance to send a message to the other side of the enemy's country without actually passing through it.

The use of electricity in warfare has grown very much within the last ten or fifteen years, but the war between Spain and the United States promises to do more to illustrate the possibility of this branch of science than has been dreamed of heretofore. Telegraphy and telephony will both be called into play to do what has formerly been done by wig-wag signals, sending dispatches by courier, etc. Telegraph wire has been reduced so in weight that a man can transport two miles of insulated double conductors as rapidly as a column of cavalry can move. This includes the weight of the reel for paying out the wire, as well as of the wire itself. The flying field telegraph and telephone makes a kit weighing not to exceed thirteen pounds, and this includes a diminutive Morse key and buzzer, so that messages can be sent simultaneously from both instruments.

ALASKA and KOTZEBUE SOUND STEAMERS.

JOHNSON-LOCKE MERCANTILE COMPANY, Agents, "GOLD PICK LINE,"

609 MARKET STREET, SAN FRANCISCO, WILL DISPATCH THE FOLLOWING FIRST-CLASS STEAMERS:

May 28th, for KOTZEBUE SOUND. DUTCH HARBOR, NUNIVAK ISLAND, HOOPER'S BAY, ST. MICHAEL and DAWSON CITY, the newly built triple expansion steamer "**GRACE DOLLAR.**" Upon arrival in ST. MICHAEL passengers for DAWSON CITY will be transferred to the newly built, highly powered river boats and barges "**RIDEOUT,**" "**GOLD STAR,**" "**PINAFORE**" and others. The "**GRACE DOLLAR**" then will proceed without delay to KOTZEBUE SOUND, where passengers will be disembarked and placed upon the river steamer "**ARCTIC BIRD**" and will be given free passage up the Putnam River as far as FORT COSMOS. The Pacific Coast and Kotzebue Sound Transportation and Trading Company will also maintain at KOTZEBUE SOUND a Warehouse. Parties contemplating a trip to KOTZEBUE SOUND are strongly advised to take passage on the "**GRACE DOLLAR.**" She has a newly built triple expansion engine for the highest power; her bows will be sheathed so as to permit her making her way through the breaking ice; and the "**GRACE DOLLAR**" without question will be the first vessel reaching KOTZEBUE SOUND this year.

May 25th, JOHNSON-LOCKE MERCANTILE COMPANY, Agents, Will dispatch for DUTCH HARBOR, NUNIVAK ISLAND, HOOPER'S BAY, ST. MICHAEL and DAWSON CITY, the Steamship "**TILLAMOOK,**" Connecting at ST. MICHAEL with the Steamers "**STAGHOUND,**" "**GAME COCK,**" "**CITY OF DAWSON,**" and other boats.

June 1st, JOHNSON-LOCKE MERCANTILE COMPANY, Agents, will dispatch for ST. MICHAEL, DAWSON CITY, and YUKON RIVER POINTS, the magnificent Steamer "**MORGAN CITY.**" Capacity 700 passengers and 2000 tons freight. The "**MORGAN CITY**" connects at ST. MICHAEL with the "**GAME COCK,**" "**STAGHOUND,**" "**POWELL,**" "**ALVISO,**" "**RIDEOUT,**" "**GOLD STAR**" and "**CLAN MACDONALD.**"

Sailings of three additional ocean steamers early in June will be announced by us within a few days. Passenger and Freight Office

JOHNSON-LOCKE MERCANTILE COMPANY, 609 Market Street, San Francisco; 112 Yessler Way, Seattle; 809 Home Insurance Building, Chicago.

Some Pacific Coast Timber.

The timber of British Columbia, Washington and Oregon is practically the same, Douglas fir, the leading lumber of the northwest coast and the one timber accessible to all its mills. It grows only west of the coast range of mountains, in large tracts. The fir timber cut by the Washington and Oregon mills rarely yields 25 per cent clear, nor 50 per cent good enough for shipment to foreign ports. The disposition of the rough and lower grades is the conundrum of the mill man. For years California has been the market where these low grades were marketed, but this market is growing more particular. The better mills are, however, working their stock more carefully and are getting better returns in the upper grades than in former years. In the better districts it is often found 8 feet in diameter, sometimes 9, occasionally 10, very seldom larger.

The cedar of the two northern States is the next in importance. It grows to immense size. There are few tracts of cedar exclusively; the majority of it grows with fir, spruce or hemlock. It is the greatest shingle timber. The trade in shingles has grown in a decade from nothing to nearly three billions annually. They are marketed in every Eastern and Northern State. A few shipments are made abroad, but so far that demand is limited. Cedar sash, doors, finish and siding are rapidly finding a market. The doors and sash of this wood will stand in any climate. They will hold their own under any test. The cedar timber is worked at great loss; clear cedar is not easily obtained and wide stock is always a problem to the mill owners.

Spruce grows only in favored localities and generally within limited areas. It is found at its best in the counties that border on the Pacific ocean. South of the Straits of Juan de Fuca, near the California line, is found the great bodies of spruce. Some small patches and detached trees are found elsewhere, but much of this is of the tide land variety, which is only good for boxes and the cheaper grades of lumber. There are but a very few mills that can fill orders for spruce. It is one of the most valuable timbers there, much resembles white pine, and can readily be sold for it.

Hemlock is yet unknown in the markets, only a limited amount is manufactured and but a small portion of that is sold as hemlock. It will pass either for fir or hemlock in a mixed pile. It makes good flooring and a handsome finishing lumber. It has none of the bad features of Eastern hemlock. It is like spruce in being tasteless.

Larch grows in a few localities and is good timber, light in color and weight, difficult to distinguish from spruce or the lighter colored firs.

In the southern part of Oregon is found the great body of sugar pine—a valuable timber, but its sale is much restricted on account of the railway facilities. The lumber is coarse-grained, light in color and takes a good finish. Sash, doors and finish and all kinds of building material are manufactured from it.

East of the coast range of mountains is found bull pine, tamarack, some white pine and cedar. There are few large bodies and but little good lumber is manufactured. Bull pine is the principal stock cut. It has a heavy sap, which turns blue or black, warps easily and is fit only for rough work.

In southern Oregon and California is found considerable oak, which is not found in the territory farther north.

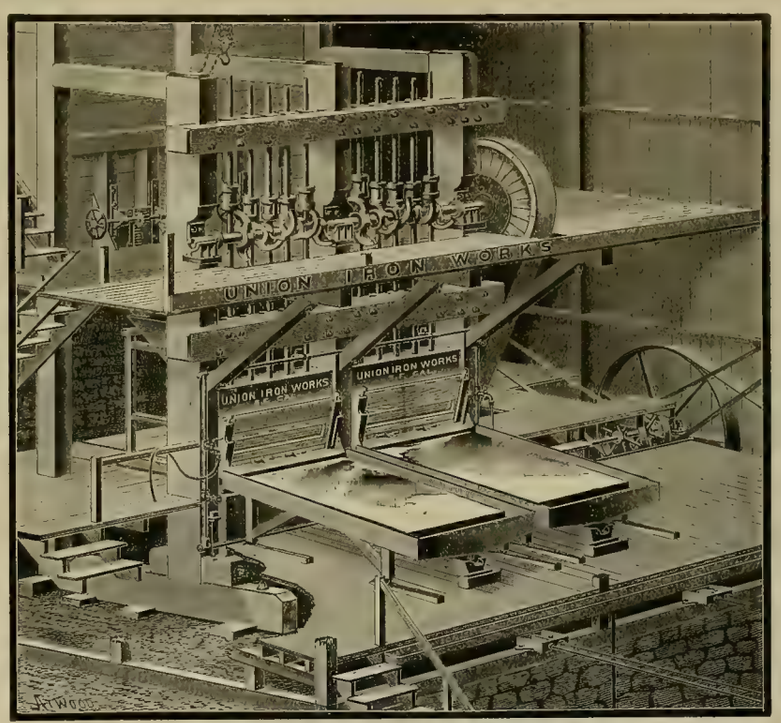
California redwood is the great staple of the northwestern part of the State, but in the mountains there is cut much other lumber that is seldom noted. The demand for boxes in California is largely supplied from this mountain timber, though redwood, spruce and sugar pine boxes are manufactured quite extensively.

The redwood of California is destined to have a greater future than its past indicates. Its shipments have been hampered by need of shipping facilities. The lumbermen of the State have had a good market at home, some abroad, and have not pushed redwood into the Eastern markets. Redwood shingles are equal to any made. The redwood timber is so nearly clear that from it shingles can be manufactured at a low cost. Redwood lumber has valuable features—it is as nearly fireproof as wood can be, it is durable above or below ground.

Ten Stamp Battery.

The illustration presented herewith is one taken from the proof sheets of the new catalogue, No. 5 (soon to be issued by the Union Iron Works), on the subject of "Metallurgical Machinery." It shows the details of a modern 10-stamp battery so completely that our readers require little or no description. The battery is of the design known as the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars. The drawing plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

The perspective of the drawing is perfect, and to those familiar with quartz-mill work the fine details will be appreciated.



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MODERN TEN-STAMP BATTERY.

The Treadwell Mine.

The Treadwell mine is on Douglas Island, Alaska, almost opposite Juneau. The island is twenty-eight miles long by fourteen miles broad and is about 4000 feet high. Most of the island is rugged and rocky and is covered with small timber. There are numerous ravines about the island, and as there is considerable rain there these ravines catch water enough to supply the power for the mines all the time everything is not frozen. There is a ditch which runs almost entirely about the island to catch the water, and this supplies the power. As the mines run all the year round, when the water is frozen steam is used.

The Treadwell mine has 240 stamps, each weighing 950 pounds, which fall ninety times a minute night and day. The number will shortly be more than doubled.

The ore is free milling and runs about $3 to $3.50 per ton, probably the lowest-grade ore mined anywhere in the world, and it could not be handled successfully but for the nature of the mine. It is not underground mining; it is taken out like rock from a quarry, and has been mined for $1.28 a ton.

Jordan Narrows, Utah, Plant.

A water and electrical power plant is now under construction on the Jordan river, along the Rio Grande Western railway, twenty-two miles south of Salt Lake City. The Jordan river is the outlet of Utah lake, and where it passes through the "Jordan Narrows" it has considerable fall, affording a good opportunity for the development of water power. Last summer a company was formed to utilize this, and within the past three months great progress has been made toward the construction of a plant.

There are several large irrigation canals taken out of the river within the "Narrows," and the right to use one of these—the Utah and Salt Lake—was purchased. The water for the power plant is thus conveyed from the head of the river's rapid fall to the lower end, where the power plant is located.

The canal runs through a very rough country, and no pains have been spared in its enlargement to meet the demands of the power plant to leave all to be returned to each of these to compensate for the taking out of the water above their headgates. Two different heads, one of 54 feet and one of 74 feet, can thus be used on any turbine, according to necessity.

There will be four 500-K. W., three-phase, 300 revolutions per minute generators, one direct connected to each turbine. The Westinghouse system of electrical machinery will be used throughout.

At the present time the canal (except the two longer flumes) is finished; the very heavy excavations for pressure pipes, the wheel-pit and the power house are completed; the pipe and connections and the casings for the turbines are on the ground. The power house, of heavy concrete and brick masonry, will shortly be started, and it is expected to begin delivering power to Bingham and Mercur as early as June 15th, the final surveys having been made and the poles distributed.—W. P. Hardesty, in Engineering News.

construction as substantial as possible. The old canal has been widened and deepened to four times its former capacity, and will now carry 600 cubic feet per second.

It has a fall of 1 foot per mile, a bottom width of from 26 to 36 feet and carries 7 feet depth of water. Three flumes will be constructed, of which the shorter one, of 200 feet, is now finished; the two longer ones, of 200 feet and 1200 feet, respectively, and which are cut-offs from the old canal line, will be built soon, the water for the present going around through its old channel. These flumes are 26 feet wide and carry 8 feet of water. Opposite the site for the power plant a very strong system of gates is put in the canal, and a concrete masonry forebay is being built. From this, four lines of 72-inch sheet pipe will lead down to the power house, a distance of 300 feet.

The wheel-pit of the power house is 13x82 feet inside, the power house being 26x82 feet. There will be four 700 H. P. turbines in two pairs.

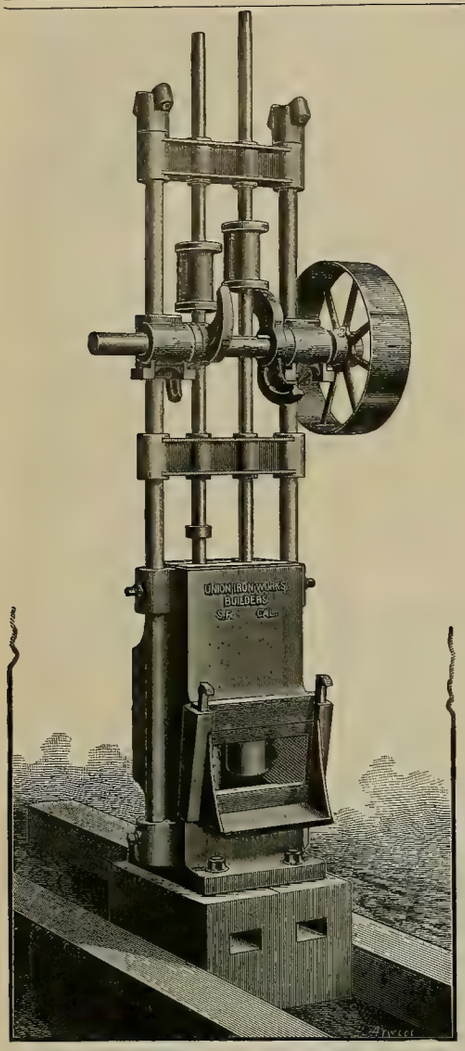
Each turbine has two discharge or draft tubes, on account of having at times to discharge water at two different levels. The longer tubes discharge into the wheel-pit, from which a tail race leads direct to the Jordan river. The shorter tubes discharge inside the power house into tail races, which lead to two other irrigation canals, one on each side of the river, and about 20 feet higher than the same. During the irrigation season a full supply will have

HON. MOSES HALLETT, Judge of the United States District Court at Denver, who is now in this city, has been in active service upon the bench for thirty-two years. During that period he has passed upon more litigation involving the bonanzas of Western diggings than any jurist in the nation. None have been more prominent in determining the rights of the miner under the law of apex. He presided in the famous Bonnybel - Durant case in the trial of which 110 experts participated, and upon which over $300,000 was expended for testimony and court costs. It was after this avalanche of testimony that almost bewildered the jury, that the court suggested to counsel that it was of the opinion that more intelligent conclusions could be arrived at were more testimony from practical and less from expert sources introduced. The next mining case found the experts reduced to about ten on a side, and with that the decadence of the expert began. Litigants and lawyers suddenly awoke to the fact that the expert was a very expensive article. His compensation ranged $15 to $100 a day, while the more eminent were allowed as much as $250 for each day they were on the witness stand, and then there was the hotel bill that at times reached enormous proportions. This has been, to a very large extent, reformed, however, and to the gentle admonition of Judge Hallett litigants are indebted for a saving of thousands of dollars.—Salt Lake, Utah, Tribune.

IT is reported from Marysville, Cal., that an experiment concluded there by Dr. F. A. C. Perrine of Stanford University, utilizing the electrical power line of the Yuba Power Company from its power house to Browns valley, a distance of ten miles, demonstrated that 36,000 volts may be transmitted over a copper wire, using glass insulation, against 16,000, which has been the maximum in power transmission heretofore. If so, this would effect a considerable saving in the cost of wire in the construction of electrical transmission plants in the future.

LAST Saturday the House Committee on Public Lands agreed to favorably report to the House the war bill relieving holders of mineral claims from the necessary assessments during service in war, and one of similar scope giving homesteaders leave of absence, and, if discharged for service wounds, deducting their full term of enlistment from the required five years' homestead residence.

HEAT continued some length of time throws the carbon in steel out of solution and into the graphitic or uncombined state, and then it will not temper; that is, the hardness is all let down as soon as the temper commences to run.



PROSPECTING BATTERY.

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Two-Stamp Self-Contained Battery

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Expressly for Prospecting Work.

It was awarded First Prize at the recent Mechanics' and Manufacturers' Fair, where it was in daily operation, crushing ores from various mines throughout the State.

Weight of stamps, 275 pounds each; capacity of battery, determined by actual work, 200 pounds per hour, through a No. 7 slot-punched screen.

Entire battery weighs about 3000 pounds; heaviest piece, mortar, weighing 1200 pounds.

Can be taken apart and transported to any locality.

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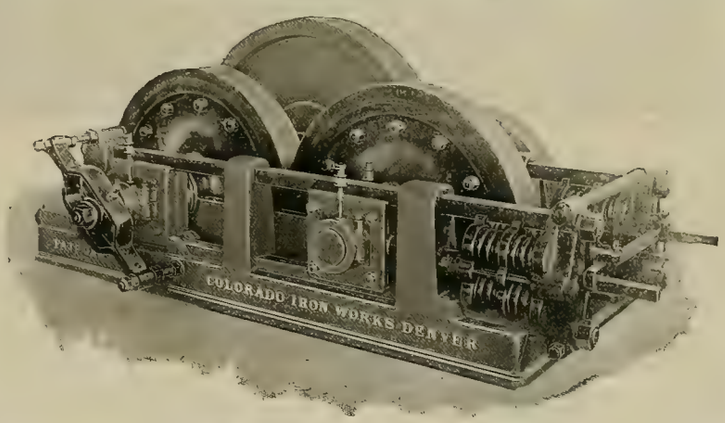
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as being the most efficient and the most economical machine for fine dry crushing ever placed upon the market. The rolls having

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can be fed evenly over the whole width of faces with certainty, and hence the faces or crushing surfaces are easily kept true. Descriptive pamphlet on application.



HIGH SPEED SPECIAL ROLLS, WITHOUT HOUSING.

Double rope tramways are acknowledged to be superior to those of the single rope type, and any one contemplating the erection of a tramway should investigate the merits of the . . .

THE ONLY AUTOMATIC TRAMWAY BUILT.

FINLAYSON PATENT AUTOMATIC WIRE ROPE TRAMWAY.

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WITH THE Improved Electrical Shovel or Dredge and Amalgamator,

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THE BENNETT Amalgamator Manufacturing Co.,

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These plants, being the outcome of many years of evolutionary experiment in the field of their actual operation, are constructed in the most thoroughly substantial and workmanlike manner, of the best material the market affords, with a view to their maximum efficiency, strength and durability; the operating portions almost exclusively of steel, to gauge, and therefore interchangeable, and having been thoroughly tested as to all points, under widely varying conditions, are fully warranted to perform as indicated in the following table:

FOR "GULCH," "BAR" AND "HILL" DIGGINGS.

Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
1...	2500	2 to 4	25 to 150	150 tons	Single operating plant
2...	5000	2 to 3	50 to 300	200 tons	Duplex operating plant
3...	7500	2 to 2½	75 to 450	300 tons	Triplex operating plant

SWAMP AND RIVER-BED PLANTS.

Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
4...	2500	2 to 4	Barge	250 tons	Single amalgamator
5...	5000	2 to 3	Barge	325 tons	Duplex amalgamator

In general terms it may be said these plants consist of the electrically operated dredge and amalgamator, mounted either on steel barges for swamp or river-bed mining, or steel-bodied cars for "gulch," "bar" and "hill diggings," together with the necessary power plants for their operation. Several operating plants, either in close proximity or scattered over a large district, may be operated from a single power station, which may be situated at any convenient point within a radius of a few miles, at railroad depot or where water power can be utilized. The river plants, complete in themselves (each barge containing its own power), are made single or duplex; any suitable number of either can be operated on a river, each independently working its allotted section from surface to bedrock, and rim-rock to rim-rock. All these plants are built with a view to easy transportation, in "knock-down" shape over ordinary mountain roads, and, on special order, the size and weight of separate parts may be still further reduced. In the foregoing table the figure representing the smaller quantity of water required applies to cases where, for any reason, it is desirable or necessary to use the water over and over. The water required may be taken from below the placer, thus obviating the necessity of long ditches, etc. Since these plants neatly pile their debris on the cleaned-up bedrock of the ground worked, they may be said to create their own dump, and hence are enabled to successfully operate on flat ground, or where ordinary dumping facilities are lacking. This peculiarity also renders them independent of "debris laws." The wonderful perfection with which these plants extract the finest, microscopic particles, such as are held in suspension in water, or, when dry, ascend in a gentle current of air, constituting in bulk a perfectly impalpable powder (send for samples), renders them particularly valuable and indispensable in cases where, owing to the fineness of the golden particles, very rich mines are unavailable for profitable working by the hydraulic or sluice processes.

All plants are furnished with duplicate parts and wearing pieces to cover at least two years' constant use, while the life of the plant is conservatively placed at twenty-five years' active service. For further information address as above.

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The phenomenal mill of the century. Now perfected under several letters patent. Great capacity and small cost.

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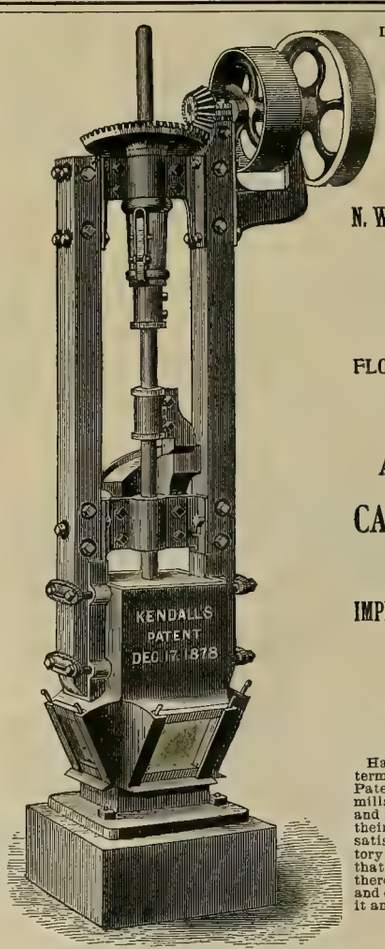
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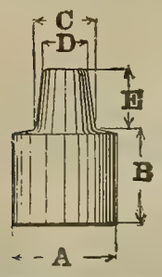
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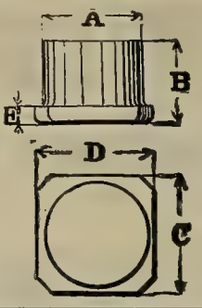
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We beg to call attention to our RISDON HAMMERED PROJECTILE STEEL SHOES AND DIES, which are made of a special quality of steel, are hammered and then compressed in moulds so as to give the greatest possible density.

These Shoes will outlast any other make and will not chip or cup.

We have attached a sketch showing sizes; fill in the size of your Shoes and Dies, and order a trial set.

Our prices are as low as any, and the article we offer should commend itself to all mine owners and mill men.



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B=..... "
C=..... "
D=..... "
E=..... "

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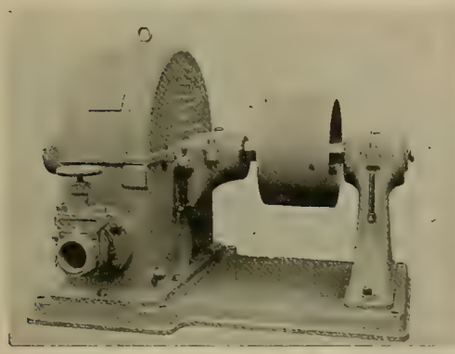
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ELECTRIC POWER TRANSMISSION.

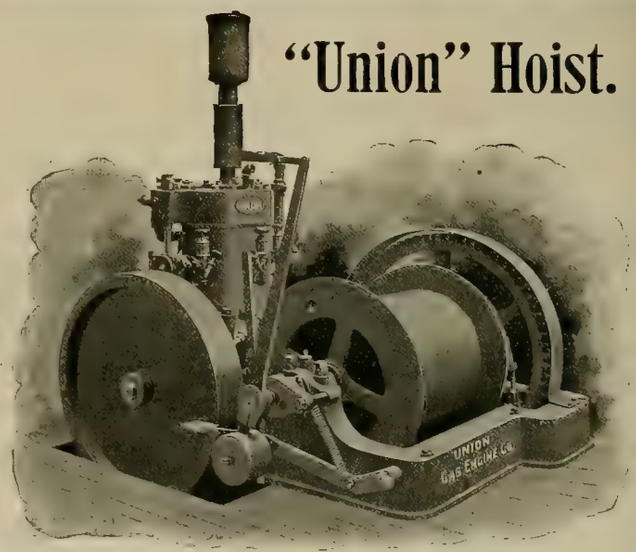
Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries.

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"Union" Hoist.



The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

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"Union" Gas Engines,

Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

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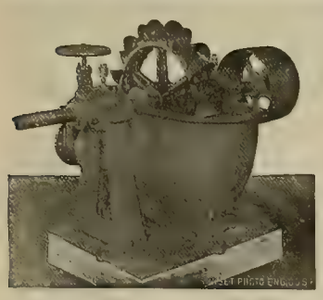
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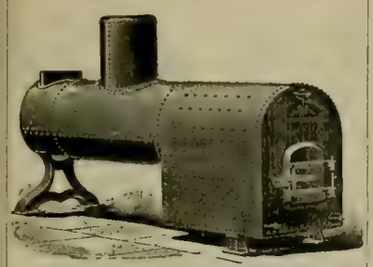
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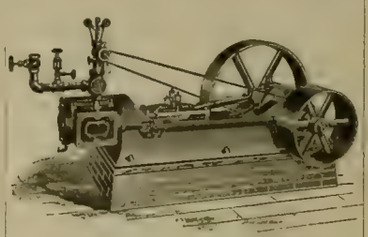
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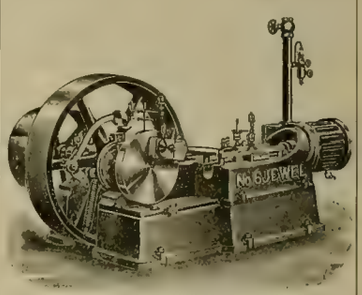
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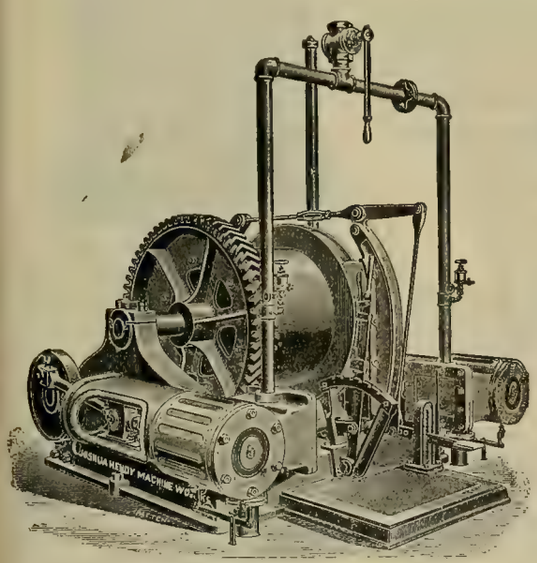
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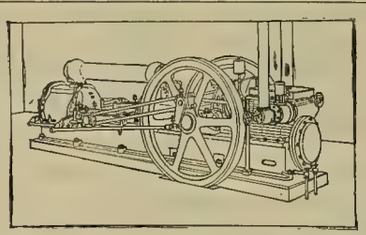
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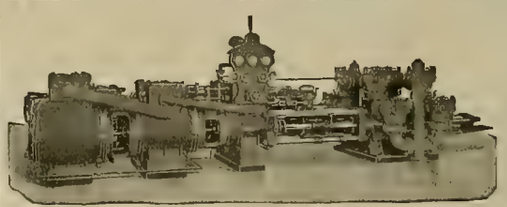
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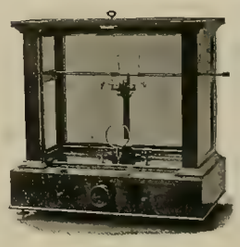
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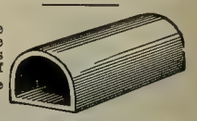
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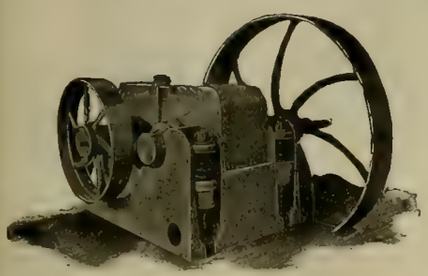
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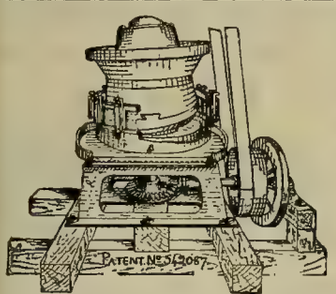
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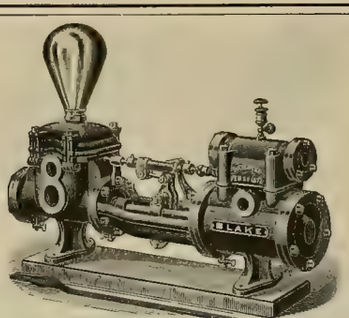
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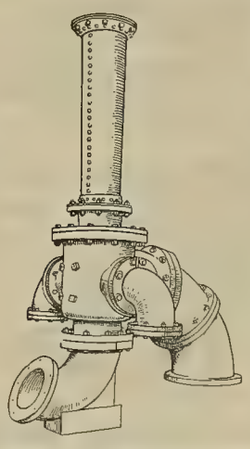
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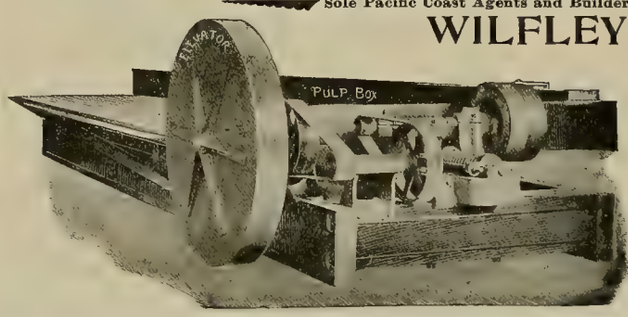
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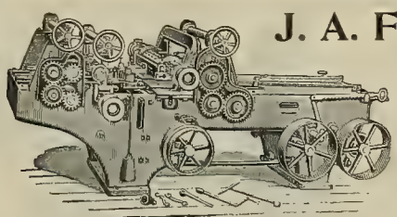
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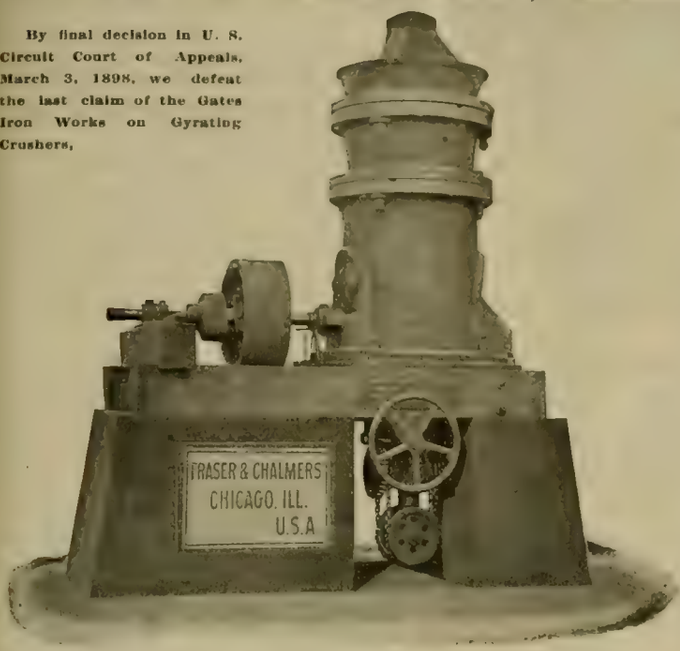
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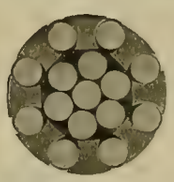
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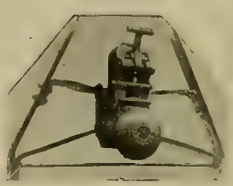
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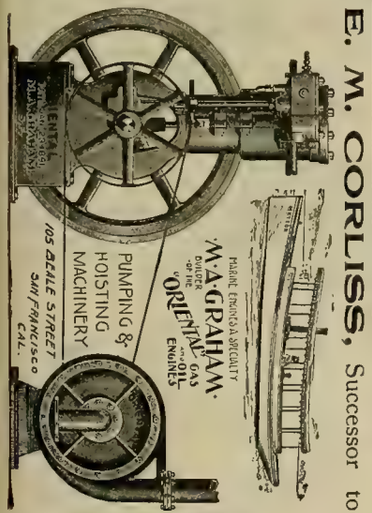
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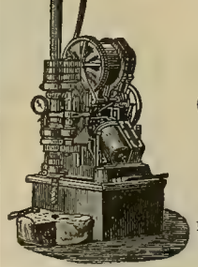


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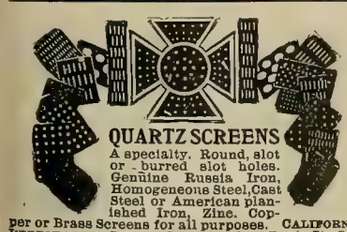
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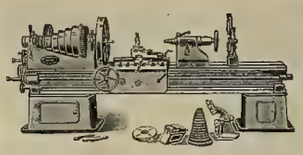
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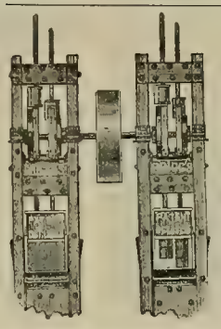
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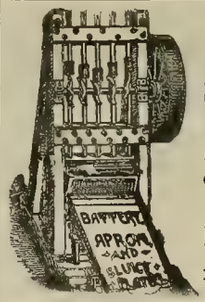
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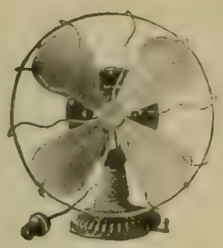
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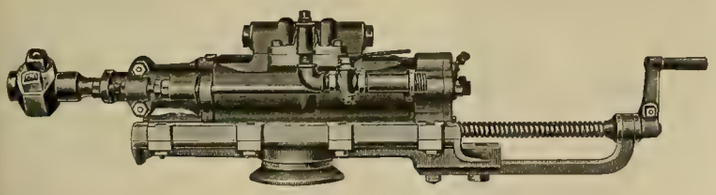
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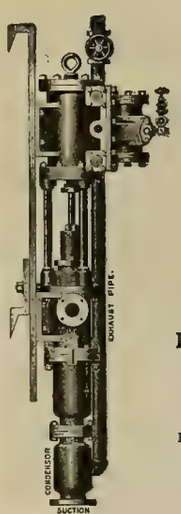
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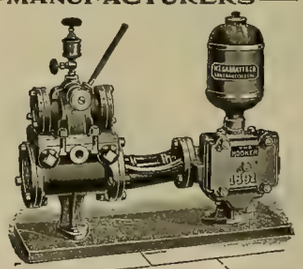
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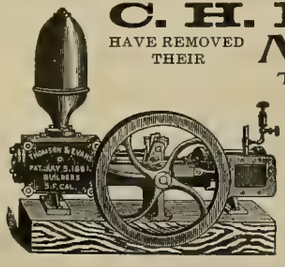


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Where, with Enlarged and Increased Facilities, they are better than ever prepared to do
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Promptly, and at Reasonable Prices, and will continue the manufacture of
Thomson & Evans Steam Pumps,
Deep Well Pumps, Power Pumps, Etc.,
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

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WHICH FOR STRENGTH AND TRACTION POWER HAS NO EQUAL.



Especially Adapted for
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EVERY BELT GUARANTEED.
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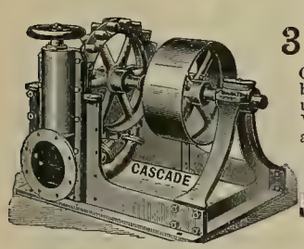


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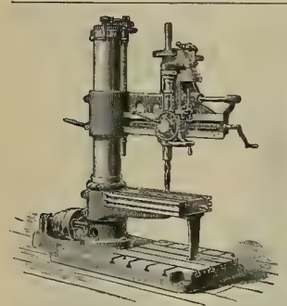


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PLAIN TABLE MACHINE.

This Drill possesses every means for rapid operations and great results. The back gears are directly on the spindle and are thrown in and out while the Machine is running. The tables are extra long, supported by an outside brace to prevent chatter. The Machine is complete with Automatic Stop, Quick Return, Power Feed, etc.

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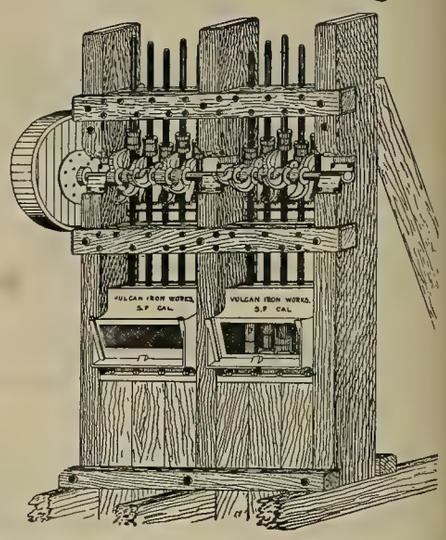
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Is superior to shingles or iron, and is especially adapted to mill construction on account of its resistance to

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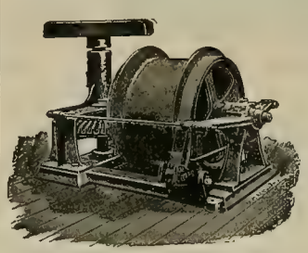
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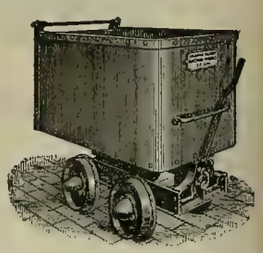
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Specialty of PROSPECTING, MINING and MILLING PLANTS.

ORE and WATER BUCKETS.

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ADAMANTINE SHOES AND DIES

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CHROME CAST STEEL

Cams, Tappets, Bosses, Roll Shells and Crusher Plates.


STAMP SHOES.


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These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

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Special attention given to the purchase of Mine and Mill Supplies.


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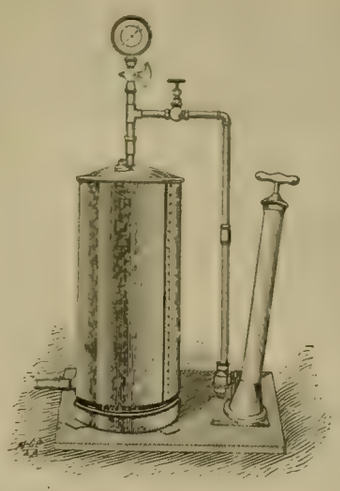
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Mining and Milling Machinery and Supplies.

SMITH-VAILE PUMPS, (For Every Purpose.)
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TRUAX AUTOMATIC ORE CAR, (We Make 'em.)
HORSE WHIMS, WINDLASSES, BUCKETS AND SKIPS.
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CANTON Drill, Groove and Pick STEEL.

Costs no more than is asked for inferior Steel, and is guaranteed equal to Jessop's best.



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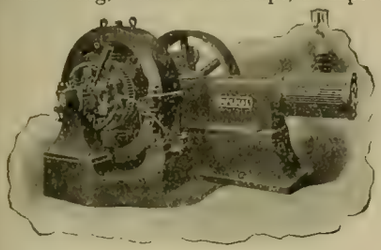
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DIOXIDE SODIUM, ZINC SHAVINGS, BORAX GLASS, C. P. TEST LEAD,
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And everything required by Assayers, Miners and Chemists.

Write for a copy of our New Illustrated Catalogue.

F. W. BRAUN & CO.,
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The IMPERIAL ENGINES.

Self-Oiling, without Oil Cups, Pumps or Tanks. Adjustable and accessible bearings. Renewable bushings for main and rocker arm bearings. Frictionless four-admission slide valve. Oil chamber entirely separated from steam cylinder contact. Rite's inertia governor. Perfect regulation. All sizes. Simple or compound. Belted or direct connection. High, medium or low speed. Designed for every use.



WESTON ENGINE CO.---Painted Post, N. Y.
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THE MACHINERY & ELECTRICAL CO.,

Southern California and Arizona Agents for
Gates Iron Works Mining Machinery.
Stamp Mills, Ore Crushers, Ore Cars, Etc.
Tremain Steam Stamp Mills.
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Also Dealers and Jobbers in
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Shafting, Belting, Pulleys, Packing, Etc.
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Construction of Electric Light and Power Plants a Specialty.
Correspondence Invited.

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Mining Timber

WRITE TO-DAY and let us make an estimate on your next order for LUMBER, SHINGLES, SHAKES and R. R. TIES. We make a specialty of MINING TIMBER and PLANK for Arizona and Mexico shipment.

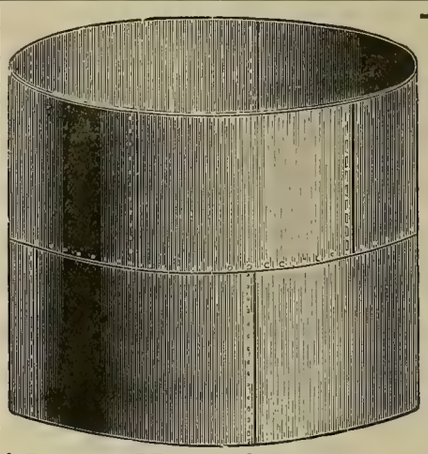
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BAKER IRON WORKS,

950 to 956 BUENA VISTA STREET, LOS ANGELES, CAL.

Stamp Mills a Specialty (from two-stamp up). HOISTING ENGINES. Agents for Henry R. Worthington STEAM PUMPING MACHINERY and the ATLAS ENGINES AND BOILERS. General Foundry Work and all kinds of Heavy Forgings. Oil and Water Well Tools. CORRESPONDENCE SOLICITED.

Manufacturers of MINING AND MILLING MACHINERY.



PIPE!

We manufacture Water Pipe for
Hydraulic Mining and Irrigation.

IRRIGATION SUPPLIES OF ALL KINDS.

WELL CASING, OIL TANKS, —AND— General Sheet Iron Work.

Write to us for an estimate on your next job.

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WRITE TO US FOR YOUR NEXT ESTIMATE.

Water Pipe for Placer, Hydraulic and Quartz Mining A SPECIALTY. Made up complete, or cut, rolled and punched to be riveted at mine.

Well Casing; Oil, Water and Cyanide Tanks; Galvanized Air Pipe; Ore Cars and Ore Buckets; and all kinds of Sheet Iron and Steel Work.

MAIL ORDERS PROMPTLY ATTENDED TO. CORRESPONDENCE SOLICITED.

THOMSON & BOYLE CO.,
308-312 REQUENA ST., LOS ANGELES, CAL.

Market Reports.

The Markets.

SAN FRANCISCO, May 19, 1898.

The war and its attendant local purchases have livened up all lines of trade in provisions and general supplies. Minerals, metallic and non-metallic, have gone ahead. The most noticeable local advance is in quicksilver. It has gone up three times since the 13th, and is now quoted at $42 domestic, $38 and $38.50 export. This week in Boston quicksilver advanced from $41.50 to $42.50 per flask. On the 15th it advanced to $43.50 in London.

The largest quicksilver mines of the world—the Almaden—says the News Bureau, are located in Spain and owned by the Spanish Government, but the Rothschilds control the output as security for loans made to the Spanish Government. The Spanish mines have a production of about 40,000 flasks per year against 30,000 flasks produced in the United States, almost entirely in this State. Foreign quicksilver is not imported, owing to $5 a flask duty and the fact that American producers keep prices sufficiently under the foreign quotations to prevent importations. An advance of $3.50 per flask in quicksilver is of great advantage to local quicksilver interests.

The Napa has an output of 7200 flasks per year, the New Idria 5000 flasks and the Ætna 3600 flasks, a total of 15,800 flasks, and as the companies have no floating debts the advance should accrue directly to the stockholders of the different companies. Stocks of quicksilver in this country are estimated at one-quarter of what they were a year ago.

Copper is also on the up grade; it is quoted locally at 14@16c ingot; sheet 17c.

An early advance is looked for in pig lead. During the civil war prices of pig lead advanced 1½c per lb., but prices have shown no appreciable change during the present war, notwithstanding the fact that pig lead is used extensively in the manufacture of ammunition. New York quotations are $3.62½; sheet lead is quoted here at 6¼@6¾c; pipe, 5½@6.

Tin plate, I. C. coke, full weight, is $4@$4.25 per box. Sheet zinc, by the cask, 600 lb., 7c; spelter, 5c@5¼c; antimony, 10@10½c.

Chemicals show in general an advance. Cyanide of potassium is quoted jobbing 33@33¼c per lb.; carloads, 29½c; sulphuric acid 2c per lb. for 66%; nitric acid, 7½c in carboys; soda ash $1.60 per 100 lbs. 58%; hyphosulphite of soda, 2¾c per lb.; blue vitrol 4¼c per lb.

In powder there is little advance. No one is busier than the powder men, government orders running into the millions. To miners the following prices are quoted, f. o. b. San Francisco: Giant and Safety No. 1, containing 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, mimimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

Fuse, triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

Caps, 3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

J. W. Harrison's coal circular says:

Since the Alameda left there have been the following deliveries from Australia, viz.: Port Logan, 3095 tons; Louisiana, 2010; Ednyfed, 1648; Sonoma, 1556; McNear, 1787; total, 10,096 tons. There are eighteen vessels due here from Sydney and Newcastle within sixty days, with about 44,000 tons of coal, all of which will come to a good market, as our yards have but little on hand. The engaged Australian list for San Francisco foots up fifty-one vessels, with about 135,000 tons coal capacity; some of these will not leave their loading port before October next. Coal freights have been advanced over 2 shillings per ton from Newcastle since last mail; this was fully expected, as shipowners are not disposed to seek this port, when we have so few inducements to offer for outward charters, our incoming wheat crop being a comparative failure. Our importers have benefited but little by the increased rates of freight from Australia, as the cargoes of fully 90 per cent of the vessels chartered were disposed of months ago; hence our consumers are insured cheap fuel. The American navy at Manila will call for considerable coal shortly, a portion of same will be shipped from here, which will serve to sustain values and deplete our stock on hand. The general outlook indicates high prices for coal throughout the entire year, and should prove a banner season for our colliery proprietors in British Columbia and Washington, as our requirements will be nearly all drawn from those sections.

Last year Sisal bale rope was quoted at 5c and Manila at 6c in 10,000-lb lots. This morning the Tubbs Cordage Co. quote three and four-strand Sisal bale rope in 10,000-lb lots at 7¾c and Manila at 8¾c, while two-strand Manila is 9¼c. In smaller lots, ½c per pound more. There is a shortage in the Sisal hemp crop in Central America, and shortage and doubt about the Manila from the Philippines.

New York reports sterling exchange strong, actual business in bankers' bills at $4.86¼@4.86½ for demand and $4.84@4.84¼ for sixty days; posted rates, $4.83½@4.87; commercial bills, $4.82½; silver certificates, 57¼@58c: bar silver, 57@58½c; Mexican dollars, 45¼c.

The Whatcom, Wash., Iron and Steel correspondent says:

The coal industry of the Pacific Coast is beginning to show the effects of the increased demand for naval purposes. Both the Fairhaven and the Blue Canyon mines are doing extensive development work to increase their output. At the former a large new double drum hoist is being placed and preparation made to open a second level below the present tunnel level. At Blue Canyon work is being pushed on double shift, and the company is preparing for a large demand, not alone from government sources, but from commercial enterprises also.

It is regarded here as doubtful whether Great Britain will be able to observe her neutrality regarding coal as a contraband of war. The greater her vigilance, however, the greater will be the increase of the Puget Sound coal product. For example, California bought 1,600,000 tons of coal in 1897. Of this 558,000 tons came from British Columbia, 630,000 tons from the United States, and 412,000 from Australia and Great Britain. Should the foreign supply of coal for California be shut off, San Francisco would be forced to fall back on Puget Sound and the Rocky Mountain coal mines, greatly increasing their market and bringing prosperity to their owners and employes.

Mining Share Market.

SAN FRANCISCO, May 19, 1898.

The market was weak throughout, there being practically nothing doing, the war bulletins attracting more attention than the stock lists, wheat and Eastern stocks absorbing most of the business attention. Silver showed some improvements, being quoted in London to-day at 26½d; New York, 57⅝; local, 57¾.

Recently Declared Mining Dividends.

Elkton, Colorado, 2 cents per share, $20,000; May 20.

Cariboo G. M. & M. Co., British Columbia; payable immediately.

Sacramento, Utah, ½ cent per share, $5000; payable May 30.

Wedge, California, $2500; payable immediately.

Recent California Mining Incorporations.

Alta Con. M. Co., San Francisco; capital stock, $100,000; subscribed $50; W. B. Meckfessel, G. W. Parsons, W. F. Laumeister, A. Cook, S. K. Thornton.

Commercial Paragraphs.

THE Fulton Engineering and Shipbuilding Works will launch the Ruth and Newberry freight steamers next week from their works at Harbor View. Each boat is 160 feet long. They will also launch a stern wheeler of 160 feet length. The same company is placing new machinery in the Chas. Nelson, putting in a triple expansion 900 H. P. engine, electric lighting plant, distilling apparatus, etc. The boat will make her trial trip next week.

THE Jeanesville Iron Works Co., on June 1st, move into their new store, Columbia Hotel Block, 1328 Seventeenth St., Denver, Colo. They will carry a stock of station mine pumps and Cameron pattern sinking pumps and a full line of duplicate parts for repairs.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 19, 1898.

9:30 A. M. SESSION.

500 Bullion	05	500 Overman	07
200 Challar	17	100 Potosi	18
10 Con Cal & Va	50	100 Sierra Nevada	53
200 Gould & Curry	18		

SECOND SESSION—2:30 P. M.

200 Ophir	36	200 H. & N.	75
200 Mexican	20	300 Yellow Jacket	21
200 Con Cal & Va	56	250 Sierra Nevada	52
100 Savage	11	100 Overman	07
400 Challar	18	100 Alta	14
100 Potosi	19	100 Andes	08
50 Best & Belcher	29		

STOCKHOLDERS' MEETING.

Notice is hereby given that the regular annual meeting of the NATIONAL CONSOLIDATED MINING COMPANY will be held at the office of the company, 916 Market Street, Rooms 56 and 57, in San Francisco, on MONDAY, the 6th day of June, 1898, at 8 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may properly come before the meeting.

By order of the Board of Directors.

G. W. FLEISSNER, Secretary.

San Francisco, May 12th, 1898.

HONDURAS CONCESSION.

WANTED,

PARTY to take an interest and the MANAGEMENT of a

PLACER CONCESSION

IN HONDURAS, same yielding $5.00 PER YARD. Property will stand a most rigid examination, and the best of inducements offered. Address

T. E. ROWAN,

Office Nos. 4 and 5 Bryson Block,

LOS ANGELES.

COPPER.

SOUTH BISBEE COPPER MINING and TOWNSITE IMPROVEMENT CO.

Capital Stock, $5,000,000.

NON-ASSESSABLE.

A limited number of shares of the treasury stock are offered at TWENTY CENTS per share.

Applications for stock or copy of the prospectus can be had on application at company's office, No. 4 Bryson Block, Los Angeles, where samples of the ore can be seen and full information relative to the property obtained. T. E. ROWAN, Treasurer, or, H. W. LEWIS, Secretary.

Skeleton Mining Report.

NEEDED BY EVERY MINING MAN.

FIFTY CENTS POSTPAID.

Mining and Scientific Press, 330 Market St., S. F.

WANTED.—Position to take charge of a quartz mine. Am a practical miner, and have had charge of a number of properties in different States for the last 20 years. Can furnish the best of references. Address J. D, Mining and Scientific Press.

CHEMIST AND ASSAYER

WANTS POSITION. Holds B. S. Acquainted with cyaniding. Very best reference. Terms reasonable. Address C, care M. and S. Press.

Mining Partner Wanted

With Capital to Develop One of the Largest and Richest Mines in Nevada County, California.

A rare opportunity for right party. There is millions in it. For full particulars, please address S. B. FOWLER, M. E., Grass Valley, Nevada County, California.

Position Wanted by Millman.

Am at present foreman of prominent gold mining company's mill; desire position in central or southern part of California; satisfactory references furnished; am thorough at concentrators, either Frue, Triumph or Norbom; have also good references as assayer, all first-class and reliable. State salary and particulars. Address Gold Millman, Box B, Mining and Scientific Press office, San Francisco.

FOR PROSPECTORS.

A book written by a prospector, giving information on methods and appliances used by frontier miners. By mail, Twenty-five Cents, postpaid. Address "Prospector," Mining and Scientific Press office, 330 Market St., San Francisco.

Working Capital for Mines.

PACIFIC EXPLORATION COMPANY

Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 29-30 Chronicle Building, S. F.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage.

Money loaned mines.

Mining companies organized, their property experted, financed and managed.

Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated

Examine mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG,

Marquette, Mich., U. S. A.

Cable Address: EDBEE.

Codes:
LIEBER'S.
BEDFORD McNEILL'S.
A B C UNIVERSAL COMMERCIAL.

For Sale Cheap.

10,000 FEET GOOD 18-INCH STEEL PIPE,

IN USE ON SURFACE IN AMADOR COUNTY.

Address:

FRANK H. JACKSON,

105 South Broadway,

LOS ANGELES, CALIFORNIA.

THE ROESSLER & HASSLACHER CHEMICAL CO.

100 William Street, New York.

CYANIDE

Peroxide of Sodium

Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

Trade Mark.

And other Chemicals for Mining Purposes.

ORES! ORES!

Gold, Silver and Lead Ores and Concentrates

PURCHASED AT REDUCED RATES FOR TREATMENT.

SELBY SMELTING & LEAD CO.

416 Montgomery St., San Francisco.

Consign shipments to Vallejo Junction, Cal.

La Sal Mountains.

NEW, RICH MINING DISTRICT.

Best reached by way of the

Rio Grande Western Railway

from CISCO or THOMPSONS stations.

Daily stage from Thompsons to Moab—here outfits can be secured at very reasonable rates—thence by wagon or saddle to LA SAL MOUNTAINS, twenty miles distant.

The formation is igneous and all the metamorphic rocks abound. Veins of quartz, quartzite, porphyry, granite and spar are well defined. The district promises a great future.

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Assessment Notices.

RED CAP MINING COMPANY. LOCATION of principal place of business, San Francisco, California; location of works, Red Cap Creek, Humboldt County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of April, 1898, an assessment (No 3) of two dollars per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, 125 Beale St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 27th day of June, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. H. MARTIN, Secretary.

Office—125 Beale St., San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 10th day of May, 1898, an assessment (No. 1) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 213 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 5th day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson St., San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 916 Market street, Room 57, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of June, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 23rd day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—No. 916 Market street, Room 57, San Francisco, California.

LEON GOLD MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, near Winchester, Riverside County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 1) of $1\frac{1}{2}$ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Room 7, fifth floor, Mills building, San Francisco, California.

DELINQUENT SALE NOTICE.

TUBER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Panamint District, Inyo County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 22nd day of March, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Zerah Castle	8	6,250	3 125 00
Hugh McDonnell	17	1,000	500 00
Hugh McDonnell	18	1,000	500 00
J. W. Pew, Trustee	74	12,484	6,242 00
Nat Stein, Trustee	75	8,317⅓	4,158 83
Nat Stein, Trustee	76	8,317⅓	4,158 83
Nat Stein, Trustee	77	14,500	7,250 00
W. Sheldon, Trustee	78	12,484	6,242 00
J. W. Pew, Trustee	79	18,733	9,366 50
Nat Stein, Trustee	80	16,749	8,374 50

And in accordance with law, and an order from the Board of Directors, made on the 22nd day of March, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on THURSDAY, the 2nd day of June, 1898, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

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FOR the convenience of our readers in the mining counties we print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 330 Market St., S.F.

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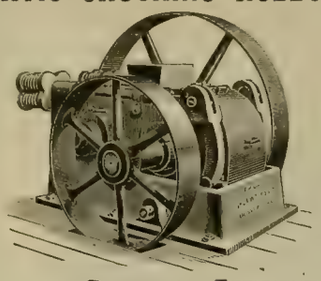
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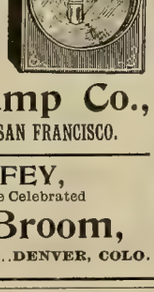
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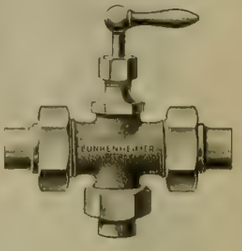
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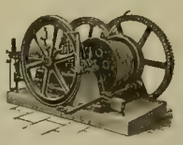


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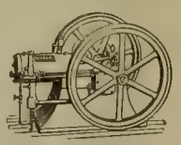
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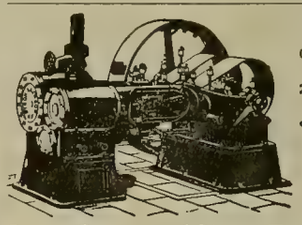


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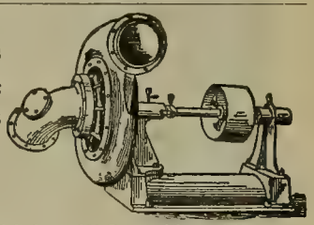
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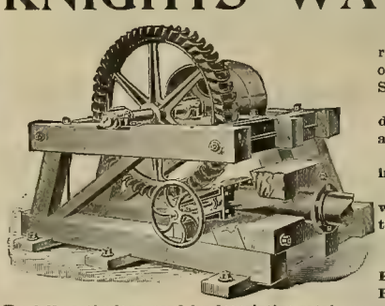
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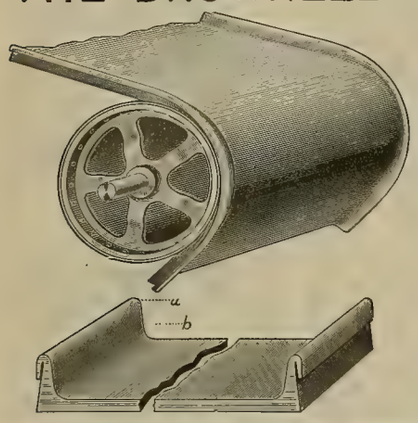
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Yours truly, JOHN ROSS JR., Superintdenent.

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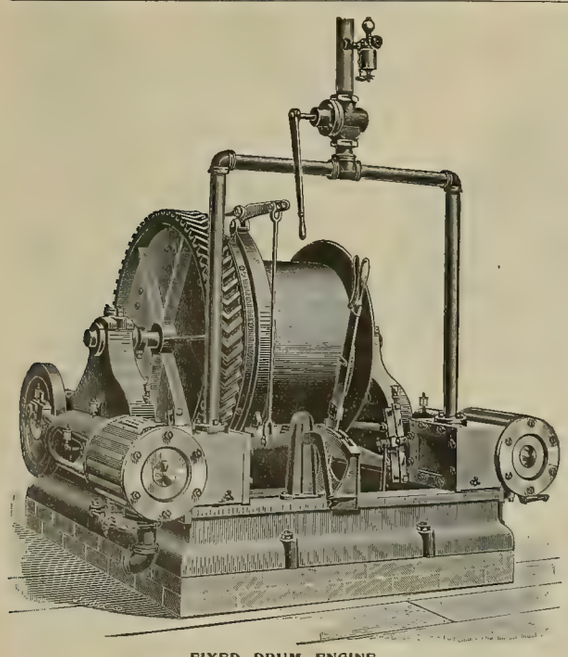
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No. 1977.—VOLUME LXXVI. Number 22. SAN FRANCISCO, SATURDAY, MAY 28, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

California's Largest Copper Producer.

In recent issues extended notice was made of California's copper mines. The great continuous demand for copper in the electrical world and the present prominence occupied by this metal justify additional remarks regarding all sources of its supply. Since the sale of the Iron Mountain property in Shasta Co., Cal., to an English company three years ago, the progress of development has been such as to make it a factor in the copper supply of the continent. A recent illustrated article in the Redding *Searchlight* by M. E. Dittmar, its editor and proprietor, gives some further statistics and information regarding California's largest copper producer.



IRON MOUNTAIN, CALIFORNIA'S GREATEST COPPER PRODUCER.



COPPER SMELTER AT KESWICK, CAL.



SURFACE ROASTING: BURNING ORE PILES, KESWICK, CAL.



KESWICK, CAL., SMELTERS AND STAFF HEADQUARTERS.

The Iron Mountain deposit is fifteen miles northwest of Redding, in a porphyry formation. The average width of 200 feet carries a little gold and silver, 7½ per cent copper, 45 per cent sulphur, the remainder being principally iron, zinc occurring in small quantities, arsenic and antimony being entirely absent. The mine shaft is 370 feet deep.

At the mine a large air compressor furnishes power for the drills, and a dynamo generates power for motor cars, which carry the ore along the tram to the dump, where it is again loaded into cars and carried to the smelters at Keswick, eleven miles distant, over the Iron Mountain Railroad, which was constructed the same year that the mine was bought, a grade of 2000 feet being overcome in the eleven miles.

The unusual size of the ore body has necessitated a different style of mining from the ordinary. Instead of timbering exclusively, or permitting huge columns of ore to stand in the works, a system of filling in is in vogue. Hard surface rock is taken in the mine to replace the ore taken out, and the great cavities are filled to the roof as the work progresses. The filling in is partially supplemented by timbering.

At the smelters at Keswick the plant at present consists of three water jacket furnaces, with a daily capacity of 600 tons, a reverberatory furnace, with a capacity of about 200 tons, designed to handle chiefly the fine or powdered ore, which is calcined in rotary furnaces built for that purpose. The capacity for handling fine ore has been largely increased by the addition of a Ropp straight line furnace with a capacity of 150 tons per day. This furnace was recently completed by the Parke & Lacy Co. of San Francisco. The plant for roasting fine ores is further augmented by the addition of a third rotary furnace. The erection of a fifth smelting or matte furnace of a new pattern is in contemplation.

The ore that supplies the water jacket furnaces comes from the surface roasters and kilns direct, loaded on cars specially built for this purpose, and a double, high, level track admits the product to the charging floors of the smelters. The two low-level tracks into the smelter yard are used mainly for the bringing of fluxes to the smelter, and a broad gauge railroad is laid for loading the matte product upon cars for shipment to the New Jersey refineries. Another mode of supply is by aerial tramway from one of the roasting stations on the hill. This ropeway supplies both the Ropp furnace with fine ore and charging floor with calcine ore. The Ropp furnace is also supplied with fine ore direct from the cars, as only the coarser ore is calcined at stations and kilns. From the point of discharge of the Ropp furnace the calcined ore is carried in cars to the charging floor of reverberatory smelter, and is fed into the furnace by means of hoppers.

The system of roasting is interesting and requires skill in adaptation to overcome the many obstacles to success. What might successfully calcine ore at other points could be applied only in a general way, and all details must be mastered as the necessities suggest themselves. In this case necessity is indeed the mother of invention. The first system employed was in the nature of a series of kilns. Several tiers of these were constructed in the form of a crescent, on the lower side of the track, with a charging capacity of about 6000 tons. These kilns are constructed of stone with side and end drafts, and a big stack leading up the mountain side carries away the dense fumes and at the same time hastens the calcination of the ore. A charge in these tiers of kiln is roasted in about thirty days.

Ground is cleared and stations established with receiving bunkers, and upon the cleared space high piles of ore built up and ignited. By this system the ore is calcined in about sixty days, but the saving is made in the practicability of extending the roasting capacity any space required without the original outlay of building kilns of masonry, and afterwards keeping them in repair. The present roasting capacity at these surface stations is probably 40,000 tons and to thoroughly calcine the ore sixty days is required, though the ore is seldom allowed the full time. After roasting, the ore is loaded on cars for the smelter, or carried by means of the ropeway.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....Publisher

San Francisco, May 28, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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AMONG the 11,000 troops in San Francisco this week are miners from all parts of the coast and Colorado. One company—F—of the Idaho regiment is composed almost wholly of Cœur d'Alene miners.

REDUCTION of expenses at the Comstock is again being advocated and practised. As yet no one has been found bold enough to advocate the reduction of miners' wages from the old bonanza rate, Virginia still being the one $4-camp in existence.

IN the close of an interesting letter of personal experience, on page 566, Chas. Taylor utters a truth that will be affirmed by thousands, viz: that the process should suit the ore, instead of "trying to make an ore fit the process," and that "a misfit manager is extremely liable to install a misfit process."

EVERY Pacific coast State and Territory—except California—is taking active measures to have its mineral resources properly represented at the Omaha Exposition. Southern California is doing some practical work in securing space; San Francisco seems content with having the "Commissioners" appointed therefrom.

NEITHER in San Francisco nor at any other U. S. mint will a private assay be made of ore for any one. The only assay done at a U. S. mint is of gold dust or bullion to determine its fineness and value. The only public concern that interferes or competes with the work of private assayers is the Arizona School of Mines—a policy that is adversely discussed in that Territory.

WHILE many prospectors have temporarily thrown aside their tools, and responding to their country's call have gone to the war, thousands are preparing for an active season's work. The Klondike, the entire Yukon region, Kotzebue sound, Alaska in general, British Columbia and the northwest States, will attract a great many during the next few months. In Washington it is expected the Colville reservation will be thrown open to mineral location by presidental proclamation next week.

IF the proposed "war tax" is levied as outlined, it will bear unequally on mining stocks, should they be taxed at par value. Industrials, railroad and bank stocks often sell for considerably more than their par value; mining stocks, on the contrary, oftentimes sell for one-twentieth of their par value, mining corporations being usually obliged to offer shares at a very low proportional figure to get working capital. If taxed at par, that class of securities would pay from 10 to 30 times as much proportionately as some other stocks.

A Governmental Right.

On the next page appears statistics of the mineral yield of California and Colorado for '97. Exact statistics of this kind are hard to procure, as in a number of cases where producers are asked to furnish the information they flatly refuse, claiming that it is an unwarranted interference with private business. If the information so asked were for private purposes they would be wholly right; as it is entirely a governmental function they are almost wholly wrong. The Government confers great privileges, and, in return, has a right to certain things, among others full and exact information when properly sought. Recognition of this general fact is evinced in the just published report of the Senate Committee on the Twelfth Census, in which it is proposed to establish stringent regulations for the taking of the census of all manufacturing and mechanical establishments, and provide fines and penalties for the refusal of the proper officials to furnish the information demanded by the Government, and for the giving of false answers to the inquiries of official enumerators. It is stated that every official of every corporation and every establishment of productive industry, whether conducted as a corporate body, limited liability company or by private individuals, from which answers to any of the inquiries are required who shall refuse to give true and complete answers, or who shall wilfully give false information, shall be guilty of a misdemeanor, and upon conviction thereof shall be fined not exceeding $10,000, to which may be added imprisonment for a period not exceeding one year.

This sounds somewhat arbitrary, but emphasizes the point, viz., that if the Government wants to it has the power and can rightly enforce it. While it would be impolitic, unwise and arbitrary for the Government to announce that any gold producer of California refusing to furnish the information demanded by the Government's properly constituted authorities made himself liable to fine and imprisonment, yet the principle is there and could not be successfully combated. Impertinent inquiries and wholesale questioning rightly rouse the fear that the information obtained may possibly be used to the detriment of the answerer, and in the case of federal representatives some of the questions are silly and useless, but exact statistical figures should be promptly and cheerfully furnished to accredited Government representatives for reasons that will readily suggest themselves to any intelligent man.

SEATTLE, WASH., reports regarding the torpedo boat built there for the Government are not encouraging. The published statements do not indicate a compliance with all the test requirements. At the time the Secretary of the Navy awarded contracts for the construction of three torpedo boats, it was thought that the Seattle builders' bid was too low—$148,000. The San Francisco bid was $175,000, not too much when all the requirements were taken into consideration. Experienced ship builders figured that at the first-named price it would be impossible to meet Government requirements.

THIS west half of America produces the coin that is the blood of business, the sinew of war, the backbone of the nation, and also sends men to fight the nation's battles. Camped in San Francisco this week were volunteer soldiers from California, Colorado, Utah, Idaho, Oregon and Washington, and as these lines are being written, the first U. S. troops that ever carried the flag to fight in the eastern hemisphere, among whom are many miners, are passing through the Golden Gate en route to the Philippines.

THERE is little use in railing at the "promoter." The fact that he exists, the true as well as the bogus variety, indicates a reason and a cause. It is just about as hard work and a good deal finer to find a man to buy a mine for a good figure than to find a good mine to sell. The promoter always was, is, and probably always will be, whether called by that name or some other.

Reservations, Timber Cutting, Etc.

In last week's issue it was authoritatively shown that the Yosemite, Cal., reservation is not open for prospecting or mining. Further questions have been received regarding Government forest reserves, the general right to cut timber on the public domain by and for the use of miners, etc., which demands further statement.

In the "Rules and Regulations" issued from the General Land Office and approved by the Secretary of the Interior June 30, 1897, under the subhead "Location and Entry of Mineral Lands," Secs. 19 and 20 say: The law provides that any mineral lands in any forest reservation which have been or which may be shown to be such, and subject to entry under the existing mining laws of the United States, and the rules and regulations applying thereto, shall continue to be subject to such location and entry, notwithstanding the reservation. This makes mineral lands in the forest reserves subject to location and entry under the general mining laws in the usual manner.

Owners of valid mining locations, made and held in good faith under the mining laws of the United States and regulations thereunder, are authorized and permitted to fell and remove from such mining claims any timber growing thereon, for actual mining purposes in connection with the particular claim from which the timber is felled or removed.

This last applies to the public domain in general. In the case of mining or prospecting in a forest reserve, the miner or prospector is not confined to the limits of the mining claim, in the use of timber, but may go outside such limits for legitimate requirements. Further specific information on this subject of cutting timber by miners and prospectors on Government forest reserves, may be had upon application to B. F. Allen, Los Angeles, Cal.

In connection with the above is to be noted a continued interpretation of the law which precludes the California miner from enjoying the privileges accorded miners in other parts of the United States. On June 3rd, '78, there were two statutes passed by Congress. One happened to be printed on page 88, the other on page 89, and all judicial interpretation in the past twenty years has ponderously presumed that the one on page 89 shall prevail, to the effect that the timber on the public lands in California is absolutely protected, while in Colorado, Montana, Idaho, North and South Dakota, Wyoming, Nevada, Utah, Arizona, New Mexico and Alaska the cutting of timber is permitted for the use of the miners and others under certain restrictions. Under the act of June 3rd, '78, (page 88) the cutting was permitted only upon mineral land, but the act of March 3rd, '91, extended this privilege to unoccupied, unreserved non-mineral public land. It is believed that proper representation in Congress by our representatives would result in removing this local restriction and place California on the same free footing with her sister commonwealths. It may be stated that the recently appointed U. S. Surveyor General, J. M. Gleaves, is a friend of the mining interests, and that miners who want prompt and authoritative response to the numerous inquiries that constantly arise regarding matters within his province would do well to write him, 610 Commercial street, San Francisco, Cal.

AS INDICATIVE of the activity in the mining world is noticed that at the University of California the senior class in the civil engineering course is this year reduced to almost nothing. A Berkeley report says: The senior class of the college of civil engineering at the University consists of one man, W. C. Pidge '99. When Pidge entered college three years ago he had a number of fellow classmen in the civil engineering college with him, but with the recent mining revival most of them changed their course to mining. The civil engineering department graduated nine men at the last commencement, and the older alumni of the civil engineering college are now looking anxiously toward Pidge to keep the line of C. E.'s from becoming extinct. Some of the world's present foremost miners are graduates of the California University and there is little wonder that in the present stir in mining the ranks of the mining college should be filled at the expense of other departments.

California and Colorado Mineral Yield for 1897.

Statistics are always interesting; when official are worthy of publication, and when approximately correct, are of value. Herewith is published the 1897 yield of California and Colorado, the former being furnished by Statistician Chas. G. Yale, the latter by Colorado's State Commissioner of Mines.

The following is the yield and value of the mineral substances of California for 1897, as per returns received at the State Mining Bureau in answer to inquiries:

Antimony	25 tons.	$ 3,500
Asphalt	22,697 tons.	404,350
Bituminous rock	45,470 tons.	128,173
Borax	8,000 tons.	1,080,000
Cement	18,000 bbls.	66,000
Clay—Brick	97,468 M.	563,240
Pottery	24,592 tons.	30,290
Coal	87,449 tons.	196,255
Copper	13,638,626 lbs.	1,540,666
Gold	767,842 oz.	15,871,401
Granite	339,288 cu. ft.	188,024
Gypsum	2,200 tons.	19,250
Infusorial earth	5 tons.	200
Lead	596,000 lbs.	20,264
Lime	287,800 bbls.	252,000
Limestone	38,796 tons.	38,556
Macadam	487,911 tons.	313,087
Magnesite	1,143 tons.	13,671
Manganese	504 tons.	4,080
Marble	4,102 cu. ft.	7,280
Mineral paint	1,115,280 lbs.	8,165
Mineral waters	1,508,192 gals.	345,863
Natural gas	63,920,000 cu. ft.	62,657
Paving blocks	1,711 M.	35,235
Platinum	150 oz	900
Petroleum	1,911,569 bbls.	1,918,269
Quicksilver	26,648 flasks.	993,445
Rubble	333,212 tons.	287,025
Salt	67,851 tons.	157,530
Sandstone	77,000 cu. ft.	24,086
Serpentine	2,500 cu. ft.	2,500
Silver	754,649 oz.	452,789
Slate	400 squares.	2,800
Soda	5,000 tons.	110,000
Total value		$25,142,441

The aggregate yield in 1896 was $24,291,398, and in 1895 it was $22,844,664.

The relative rank of the counties of the State, in point of mineral production, is given in the following table. In each case the value includes that of all mineral substances combined produced in the respective counties for the year. Some counties produce, in addition to gold and silver, five, six or seven other substances, while other counties, which yield little or no gold or silver, produce in large quantities quicksilver, mineral oils, copper, lead, asphalt, structural materials, etc. The figures after the names of the counties indicate aggregate value of all mineral products for the year, including the precious metals. The term "undistributed" includes total values of such substances as are grouped to avoid disclosing private business, as in the case of a single operation in a county. In the tables published by the State Mining Bureau, from which these figures are taken, the amount and value of each substance in said county is set forth. It is, therefore, necessary in some cases to place the figures in the "undistributed" column.

1.	Shasta	$ 2,224,706
2.	Nevada	1,895,567
3.	Tuolumne	1,811,383
4.	Los Angeles	1,648,574
5.	Placer	1,578,637
6.	Calaveras	1,444,006
7.	Amador	1,368,770
8.	San Bernardino	1,312,780
9.	Trinity	1,107,961
10.	Kern	931,604
11.	Siskiyou	842,157
12.	El Dorado	685,312
13.	Butte	680,010
14.	San Diego	626,568
15.	Mono	598,480
16.	Napa	555,372
17.	Santa Barbara	491,382
18.	Mariposa	452,087
19.	Sierra	370,254
20.	Ventura	368,282
21.	Plumas	339,953
22.	Inyo	339,079
23.	Alameda	303,330
24.	Santa Clara	301,800
25.	Humboldt	290,551
26.	Santa Cruz	242,941
27.	Lake	211,131
28.	Sacramento	201,663
29.	Riverside	188,022
30.	San Benito	158,423
31.	Yuba	141,638
32.	Madera	124,427
33.	Sonoma	120,797
34.	San Francisco	114,717
35.	Fresno	114,334
36.	Contra Costa	106,380
37.	Marin	96,200
38.	San Joaquin	79,411
39.	Lassen	49,950
40.	San Mateo	40,000
41.	Stanislaus	39,217
42.	Solano	31,278
43.	San Luis Obispo	28,016
44.	Tulare	22,544
45.	Del Norte	16,710
46.	Orange	12,000
47.	Colusa	3,290
48.	Tehama	2,400
49.	Monterey	2,200
50.	Undistributed	438,264
	Total	$25,142,441

In 1897 all the antimony produced in California was from Kern county. Asphaltum was produced in Kern and Santa Barbara counties; bituminous rock in Santa Cruz and San Luis Obispo. Brick clay in quantities was utilized in Alameda, Butte, Kern, Los Angeles, Marin, Sacramento, Santa Clara, San Joaquin, San Francisco and Shasta counties. The cement all came from San Bernardino. Clay for pottery was from Amador, Placer, Riverside, Sacramento and Solano counties. The coal was from Alameda, Amador, Contra Costa and Riverside counties; and the copper from Calaveras, Nevada and Shasta counties. The granite produced was from Madera, Nevada, Placer, Sacramento, San Luis Obispo, Solano and Tulare; gypsum from Los Angeles and San Benito; infusorial earth from Los Angeles; and lead from Inyo and Mono counties. The lime and limestone came from El Dorado, Kern, Mono, Monterey, San Benito, San Bernardino, Santa Cruz, Shasta, Solano and Tulare counties. Macadam was quarried in largest quantities in Alameda, Los Angeles, Marin, Sacramento, San Benito, San Francisco, Solano and Sonoma counties. The magnesite was all from Napa county; manganese from Alameda; marble from Amador and San Luis Obispo. and mineral paint from Calaveras, Sonoma, Riverside and Stanislaus counties. Mineral waters were bottled and sold from Butte, Colusa, Contra Costa, Fresno, Humboldt, Lake, Monterey, Napa, Santa Barbara, San Benito, Santa Clara, San Diego, San Luis Obispo, Sonoma and Tehama counties. The natural gas is mainly from San Joaquin, though a little is utilized in Santa Barbara county. Paving blocks are from Sacramento, Solano and Sonoma. The platinum is from Trinity and Del Norte. Petroleum is from Fresno, Los Angeles, Orange, Santa Barbara, Santa Clara and Ventura counties. Quicksilver was produced in Colusa, Lake, Napa, San Benito, Santa Clara, San Luis Obispo, Sonoma and Trinity counties. Rubble in quantities was quarried in Humboldt, Madera, Placer, San Diego, San Francisco, Sacramento, San Luis Obispo and San Mateo counties. Salt came from Alameda, Colusa, Riverside and San Diego; sandstone from Colusa and Yolo; serpentine from Los Angeles; slate from El Dorado; and soda from Inyo. Many of these substances are found in other counties than those named, but were only mined in 1897 in the counties stated. Only three counties produced as many as seven different mineral substances in 1897, and these were Los Angeles, Sacramento and San Luis Obispo.

As far as the largest production of different substances was concerned, the "banner counties" of 1897 were as follows: Alameda county leads in production of manganese and salt; Amador in marble; Colusa, sandstone; Contra Costa, coal; El Dorado, slate; Humboldt, rubble; Inyo, lead and soda; Kern, antimony; Los Angeles, brick clay, gypsum, infusorial earth, serpentine and petroleum; Napa, magnesite, quicksilver and mineral waters; Nevada, gold; Riverside, pottery clay; Sacramento, granite; San Bernardino, borax and cement; San Francisco, macadam; San Joaquin, natural gas; Santa Barbara, asphaltum; Santa Cruz, bituminous rock, lime and limestone; Shasta, copper and silver; Siskiyou, platinum; Sonoma, mineral paint and paving blocks.

It is to be noted that only one county has had the lead in five things—Los Angeles; two lead in three articles—Napa and Santa Cruz; and five in two—Alameda, Inyo, San Bernardino, Shasta and Sonoma.

Colorado's State Commissioner of Mines, H. A. Lee, furnishes the following as the total production of gold, silver, copper and lead in that State for 1897:

Gold—947,249 ounces	$19,579,636 83
Silver—21,278,202 ounces	12,692,447 47
Copper—9,151,592 pounds	960,917 13
Lead—80,799,778 pounds	2,731,032 49
Total	$35,964,033 92

COLORADO PRODUCTION OF GOLD AND SILVER FOR 1897.

County—	Gold.	Silver.
Arapahoe	$ 2,108 34	$ 8 35
Archuleta	702 78	207 58
Boulder	512,657 34	82,743 50
Chaffee	226,935 93	82,126 89
Clear Creek	782,648 88	860,500 76
Conejos	1,054 17	58 46
Costilla	5,415 54	287 51
Custer	2,129 01	16,011 25
Delta	289 38	16,011 25
Dolores	43,469 01	107,310 05
Douglas	475 41	5 96
Eagle	34,766 94	27,466 44
El Paso	10,131,855 24	35,717 82
Fremont	12,877 41	909 66
Garfield	310 05	25 05
Gilpin	2,086,471 14	223,339 74
Grand	1,942 98	50 70
Gunnison	40,761 24	62,000 81
Hinsdale	168,171 12	145,210 17
Huerfano	723 45	99 62
Jefferson	8,247 33	962 75
Lake	2,063,858 16	3,251,710 59
La Plata	29,475 42	840 47
Larimer	2,976 48	57 86
Las Animas	640 77	5 37
Mineral	61,327 89	1,831,598 58
Montrose	6,552 39	507 62
Montezuma	7,668 57	62 63
Ouray	552,839 82	1,656,119 02
Park	133,619 44	119,267 19
Pitkin	164,429 85	2,743,867 79
Rio Grande	22,592 31	4,872 21
Routt	9,776 91	4,655 68
Saguache	13,745 55	1,480 51
San Juan	694,325 97	657,287 53
San Miguel	1,458,144 48	306,664 83
Summit	273,650 13	306,664 83
Totals	$19,579,636 83	$12,692,447 47

NOTE.—Gold is figured at its coinage value, $20.67 an ounce; silver at 59.65 cents an ounce.

COLORADO PRODUCTION OF COPPER AND LEAD FOR 1897.

County—	Copper.	Lead.
Boulder	$ 6,139 77	$ 10,448 09
Chaffee	18,153 55	57,000 02
Clear Creek	54,183 57	177,893 32
Costilla	52 71	1,691 62
Custer	91 77	71,015 19
Dolores	4,163 67	36,921 79
Eagle	231 00	38,667 64
El Paso	170 58	185 63
Gilpin	106,952 48	67,860 19
Gunnison	590 85	34,243 25
Hinsdale	848 93	187,591 96
Huerfano	9 66	36 06
Jefferson	168 21	341 14
Lake	330,414 21	801,090 09
La Plata	44 10	28 97
Mineral	157 50	205,526 75
Ouray	220,433 82	263,106 36
Park	6,090 21	152 605 35
Pitkin	877 80	150,928 96
Rio Grande	55 84	405 80
Routt	100 59	2,999 28
Saguache	321 38	313 19
San Juan	150,696 32	271,123 79
Summit	14,015 61	59,108 12
San Miguel	37,252 00	140,059 32
Total	$960,917 13	$2,731,032 49

NOTE.—Copper is estimated at $0.105 per pound and lead at $3.38 per 100 pounds.

Scientific and Accurate War Reports.

Referring to the illustrated article in last week's issue on the production of animated pictures, it is further interesting to note the recent remarks of T. A. Edison's agent to the N. Y. *Electrical Review*, showing a new scientific system of "reporting" war news for the papers. He said:

"Newspapers are busily engaged and spending money without stint to get news from the front, and we are quite as busy getting picture reports from the scene of action in connection with the war. By picture reports I mean actual animated pictures of the movements of troops, ships, etc. Our representative will be among the first to land in Cuba. He will be properly accredited, and you may expect the portrayal of some very thrilling scenes by means of the Edison projectoscope.

"When a batch of negatives arrives it means practically the issuance of a war extra by us. The subjects are telegraphed ahead to us here, and the factory works day and night to get the negatives properly developed and rushed to the theaters and other customers. We issue extras properly describing the subjects and keep the printers right at it so as not to lose a moment. Telegrams by the score are rushed to the theaters, and in a marvelously short time the pictures are shown to the audience. The anxiety which awaits the first development of a film at the works is very great, as any one of a dozen accidents might happen, which would ruin the production, and time, labor and money would be thrown away. In the film taken at Havana—the 'Funeral of Nine of the Maine Victims,' which, by the way, is one of the most remarkable ever taken—there are no less than 2500 pictures, each one complete and perfect in itself. The scene must have no breaks in continuity or the result is not satisfactory. These scenes are taken at a rate of about forty pictures per second.

"We have our troubles, however, because we are limited as to the time of day in which to take the pictures. We must have a good light and if battles are to take place at night or in a rainstorm we have to throw up our hands. It seems a large proposition to take a battle, but it can be done, and right in this line let me say that Mr. Edison stated the other day that there should be an animated picture camera on the bridge of every war vessel to take engagements between ships, maneuvers, etc., and thus secure a perfect record of the whole thing. The United States Government has spent hundreds of thousands of dollars in the preparation of the annals of the Civil War. Well, here is a chance for a faithful and more vivid record than is possible in cold type.

"Suppose, for instance, our man who was at Hongkong shortly before the battle of Manila and from whom we have not heard for some time (and naturally suppose he went to Manila with one of the ships) had really taken the great naval battle. Would it be possible to find a scene to reproduce which would so thrill an American's heart?

"We are in the infancy of this great invention of Mr. Edison. It will surely be a most important factor in matters of record in the near future and play a part in mechanical and medical science as well."

Colorado Ore Market.*

Inquiries relative to the methods pursued for the determination of values contained in ores, manner of settlement, prices paid, etc., etc., etc., are of frequent occurrence. These questions in the main emanate from non-residents, who have mining interests in the State and seem to feel that the value fixed upon ore is largely a matter of caprice with the smelters or ore buyers. To correct this erroneous impression, a brief description, general in character, will suffice.

What is known as "ore sampling" or "sampling" is the determination of values in ores placed on the market. This process consists of so mixing the ore that the final portion taken to the assayers is an average of the whole.

The methods pursued for obtaining this homogeneous mixture are largely dependent upon the character of the ore being treated. For illustration, what is known as a "spotted ore" will be traced through. A spotted ore is one having finely disseminated "spots" of high-grade ore scattered through a comparatively barren gangue. Free gold in small "spots" throughout a barren quartz would be called "spotted ore." Ores of this character, after being received and carefully weighed, are passed through a rock breaker or crusher to rolls and so reduced that the whole will pass through a revolving screen, having four openings to a square inch. When thus reduced in size, the ore mass is reduced in bulk, usually one-tenth being separated and piled separately. This reduction or separation is effected in various ways, but generally by an automatic device that takes out one and permits nine-tenths to pass to storage bins. The most simple method and one used almost entirely by some plants upon "spotted ores" is to discharge the crushed ore upon a working floor, from where it is removed as fast as it is discharged, by men with shovels. If a tenth part is being separated, every alternate tenth shovelful is thrown to one side. The same method is applied if a fifth, twentieth, or any desired proportion is wanted. The tenth part, if still considered too large, may be further reduced by the same method. When the decided reduction is made, the ore is still further reduced in various ways, the most common being the use of a "split" shovel, or by "quartering." A split shovel is practically a long, narrow shovel, usually calculated to hold an amount equal to one-fifth to one-tenth of an ordinary shovelful. When a split shovel is used it is held by one man and the ore from the pile is pitched squarely upon it. The amount caught is placed alternately in two piles, one being designated as the original and the other the duplicate sample. If these samples are still too large they are further reduced, and the operation continued until each does not weigh to exceed 100 to 400 pounds, the amount being governed by the quantity of ore being sampled. If the quartering system is used, the segregated one-tenth is first shoveled into a cone, care being taken that each shovelful is poured upon the center and the ore allowed to distribute itself upon all sides of a cone thus raised. When coned the ore is scraped down, commencing at the bottom of the pile and raking same outward, thus forming a large circle of ore 3 to 6 inches deep. Then a marker is taken, usually a wooden straight edge, and slid back and forth across the center of the pile, making a plain mark and dividing the ore into quarters or four equal parts. The two opposite quarters are then wheeled off to the storage bins and the remaining quarters are reconed again and raked down and the pile again reduced in the same manner. As the bulk becomes smaller, the ore is often reconed several times before removing opposite quarters to insure a thorough mixture. When the pile has been reduced sufficient to transfer to sample room proper, it is coned and opposite quarters taken, one being designated as the original and the other the duplicate sample.

In the sample room proper, the ore is passed through finish rolls and crushed so it will all pass through an eight-mesh screen. It is then placed on an iron floor, coned and reconed and reduced further by removing opposite quarters until each sample has only from ten to forty pounds, this amount being largely in accordance with the wish of the owner of the ore. When reduced to this stage the sample is taken to another room and, after drying, passed through a grinding mill that reduces the sample to a fine pulp, or so that it will all pass through a screen, varying from 60 to 200-mesh, this being also governed by the desire of the owner. When passed through this screen the powdered ore is placed on a "blanket," usually a piece of oil cloth, and rolled back and forth until thoroughly mixed. Still further reduction in bulk is made by quartering, spreading and taking small amounts all over the spread-out mass, or by an automatic device that cuts out several sections in the ore when passed over it. The final sample weighs from two to ten ounces. These are usually cut out in triplicate or more, any one of which the owner may choose, the buyer takes one of the others and the remaining samples are filed to await settlement. Both the buyer and seller have their samples assayed and the value per ton determined. If the assay results agree, a settlement for ore is made. If the two sets of assays differ but little, settlement is usually effected by a "split," that is, an average of the two. If the assays differ materially, both buyer and seller have their assays repeated, and should the differences remain the same, the filed sample is introduced and submitted to an assayer mutually agreed upon, who is called an "umpire" and whose results are usually final.

In low-grade sulphide and iron ores, the ore is often reduced in bulk before crushing, only the segregated part being passed through the crushing machinery. After reaching the sample room proper the operation is similar on all ores, regardless of grade.

Up to the time of accepting settlement all ore remains the property of the seller. He is at all times requested to be present and watch the weighing, sampling and taking of moisture sample, and if in any manner dissatisfied, which rarely happens, he may have all the ore again placed on the car and ship same to another plant.

All of the reduction works of the State have well-equipped sampling departments, but those who do not desire to ship to a buyer direct can consign their ores to the public samplers. These plants are conducted on the commission basis and charge from 75 cents to $1.50 per ton for sampling and selling the ore. Their methods of sampling are the same as above described and their samplers are submitted to the various smelters for bids, the public samplers guaranteeing their samples and weights to be accurate.

The oft-repeated charge that reduction plants systematically rob the ore producers is without foundation. Reduction plants, as a rule, represent large investments and their financial success is largely and in most cases wholly dependent upon public patronage. As a strictly business proposition, therefore, they cannot afford to be otherwise than upright in their dealings with customers. Nothing in the work relative to ascertaining the value in ore is hidden, and inspection of same is requested rather than avoided. Settlements are made in accordance with contract, and after settlement the recovery of amount paid for ore is a matter that only interests the ore buyer.

The value of ores is primarily dependent upon the market price of metals upon the day of settlement, New York quotations governing the ore market. Having ascertained by assaying, sampling and weighing, the amount of metals contained in ores, settlements are then adjusted in accordance with contract or character of ore. In cyanide, chlorination and like plants, the ores are limited in character and are paid for upon a "flat" basis, i. e., so much for gold, less a fixed price for treatment. These rates for treatment range from $5 to $10 per ton for ore delivered at works, the price being governed by value.

The ores marketed at smelters cover all known mineral combinations, and the charges for treatment are nearly as variable as the ores treated. For this reason no fixed price for treatment is possible, but each ore is rated in accordance with its gold, silver and lead value and associated minerals. Zinc, for example, is termed refractory, and its presence in considerable quantity adds to the price of treatment. Iron, on the other hand, if it exceeds the silica in percentage, is paid for or reduces the treatment charge. Iron, however, may be in either an oxidized or sulphide form, the latter requiring roasting, the former can be used raw, and the two kinds of iron are, therefore, subject to different schedule prices. The various combinations, with differences as in iron, could be extended indefinitely, and iron is quoted for the purpose of showing that the smelter charge must be made to fit the ore and no fixed schedule can be stated.

In a general way ores are divided into classes known as lead, sulphide and silicious. Gold is paid for at rate varying from $19 to $20 per ounce; silver at rate of 95 per cent of New York quotation, and lead in accordance with percentage calculated on market quotations. The charges on lead ores vary from $10 per ton to free treatment; sulphide ores from $12 to $1.50 per ton, and the silicious ores from $5 to $12 per ton.

* Report of State Mine Commissioner.

An Unusual Mineral.

Krennerite, a mineral not previously identified from this country, has been found in the Independence mine at Cripple Creek. It occurs in brilliant crystals of a pale yellowish bronze color, but tin-white on cleavage faces. Eliminating the insoluble matter, an analysis shows the mineral to contain 43.86% gold, 0.46% silver, and 55.86% tellurium. The crystals are small and about as broad as long, and the prismatic faces are striated. They have a perfect basal cleavage, which is a prominent feature of the mineral. The lack of any appreciable quantity of silver in the Cripple Creek ores, as shown by the returns of the smelters, is proof that much if not nearly all of the mineral passing as sylvanite is either krennerite or its sub-species, calaverite. Krennerite ranges from silver-white to brass-yellow in color, and is so near sylvanite in its physical properties that frequently the eye cannot distinguish one from the other.—Georgetown, Colorado, Courier.

Some Metallurgical Methods.*

NUMBER II.

The blowing in operation, or starting of one of the blast furnaces, requires experience and a sharp eye kept on all that is going on. Following is described as the operation of starting a lead blast furnace. From two to four days before the real start is made a drying or warming fire is lighted in the brick crucible. The water pump is started and water turned on to all the cast-iron and wrought-iron steel jackets, tuyeres and separator breasts. Usually there is a separator at both ends of a large furnace, and when the fire is lighted one of these separators, breast and slag spout is taken out of the furnace to leave an opening, through which the wood is passed into the crucible. As soon as the bricks of the crucible begin to warm up, the engine driving the blower is started (or in a nest of furnaces the blast is let into the bustle pipe from the main blast or air pipe), and the fire urged, by the wind thus forced, into the furnace. Care is taken that a plentiful supply of water is kept in all the parts of the furnace, that would otherwise get heated. The fifteen tons of lead requisite to fill the crucible is now melted in, with the aid of the wood fire (urged by the blast from the blower), in lots of twenty-five to fifty bars at a time. This usually takes eight or twelve hours, and it is not advisable, though possible, to take less time, inasmuch as the lead would not retain sufficient heat to keep it molten for the few hours required, after the furnace is closed up or started, before the furnace begins itself to produce lead from the ore. Immediately all the bars of lead are thoroughly melted in, the whole of the hot ashes and coals from the wood are then skimmed off the lead, leaving it almost clean. Too much time must not be wasted over this operation, for the molten lead in the crucible is cooling while exposed to the air. It is also necessary to get these ashes out, because, if left in the furnace, they form a crust over the well or crucible, which acts as a shield, and prevents the lead reduced in the smelting operation from getting into the crucible, so allowing the lead of the well to chill from want of fresh supplies of heated lead, most probably causing a shut down of the furnaces. As soon as the ashes are all out, some easily ignited wood is thrown on the face of the molten lead, which last should be just hot enough to ignite the chips in a few moments. The corners of the furnace are well supplied also to make sure of a good fire all over the crucible. The heavier wood is then thrown in, and the mason then puts back the separator, breast and slag spout, having all necessary bricks cut the exact size required beforehand, so that the least possible time may be consumed from this time on until the blast is put on the furnace. Immediately the mason has secured the separator and its parts in place, more wood is dropped into the furnace from the top floor through the feed opening until the tuyeres are just covered with wood. If the flames have not obtained a good hold of the wood one must wait a little. As soon as satisfied that the fire has a good enough hold on the wood, some 1600 pounds of coke is emptied into the furnace out of bags which have all been weighed up in readiness. Then the following charges are shoveled into the furnace as rapidly as the eight or nine men on the furnace can do it. The first fifty of the charges given below are weighed up and stacked on the floor around the feed opening of the furnace, each charge being divided off from the next with a piece of wood. This weighing up is done to facilitate the filling up of the furnace when every moment is precious.

The following are the figures for twenty-five blowing in charges: Slag, 750 pounds; manganic ironstone, 75; limestone, 75; total, 900 pounds, not including coke in all cases; coke, 125 pounds. Twenty-five charges of slag, 500 pounds; carb. lead ore, 275; limestone, 75; manganic iron, 75; total, 925 pounds; coke, 125 pounds. Fifty charges of lead ore (carbonate), 325 pounds; slicious iron, 150; manganic iron, 75; limestone, 200; slag, 250; total, 950 pounds; coke, 125 pounds; then regular charges, 1000 pounds.

After the first fifteen charges have been put in ten bars of lead are dropped into the furnace; after the next fifteen charges ten bars more; after the next twenty-five charges come ten bars of lead, and for say fifty charges afterwards one bar of lead is fed in with each charge. This is done to get a lot of lead into the crucible quickly, for this additional lead, being heated to bright redness in its descent in the furnace, accordingly raises the temperature of the lead in the well or crucible, and stops the risk of the lead's freezing up which we first melted in. While the men are filling up the furnace see that the tuyeres are all closed on the furnace, so that no gases from the wood can get into the main blast pipe and cause damage by exploding; that all the jackets are kept cool, and the syphon from the lead well to the outside of the furnace is not choked up, and has a bright fire in it. With the wook and coke which were first put in forty of the blowing-in charges fill the furnace to within 6 feet of the feed floor; then, sending all the slag men down to the proper stations, the blast is turned on at a pressure of about three ounces to four ounces to the square inch. In a very few minutes every joint between the water

Condensed.

jackets is smoking if they have not been well rammed with fire clay. Wet clay is placed on the smoky places to check it, because, after a while, these streams of smoke catch fire and sometimes burn the wind bags. About twenty minutes after the blast has been turned on the smoke all ceases through the furnace beginning to smelt the charges which have just been put in, the first slag formed chilling on the jackets and closing the cracks. Then the tuyeres are examined frequently to judge how the slag is forming. In an hour and a quarter to one and a half hours after the blast goes on the first slag can be tapped from the furnace. The slags first produced by the furnace are purposely made lower in silica than those produced when in regular work, for, being low in silica, the newly blown-in furnace will be able to melt them easily and quickly, and so get a good start. As a rule, the first slag contains about 30 per cent of silica. When the last of the blowing-in charges are in the furnace the regular charge is put on. The following charges with slags from same, together with the dip sample assays and mattes made, will give some idea of the usual composition of the smelting charges when in regular work. The last eight are selected because sulphide of lead was used in large quantities, and no carbonate of lead ore :

SAMPLES OF CHARGES ON FURNACES IN POUNDS.
NO. 1 TO 8.

No.	Carb. Lead Ore.	Flue Dust.	Kaolin	Siliceous Flstone.	Crude Sulphide.	Iron Ore.	Ironstone.	Limestone.	Coke.
1	150	....	300	150	25	....	75	300	125
2	150	....	175	225	25		125	300	125
3	150	....	275	175	25	....	75	300	125
4	150	....	250	200	25	25	50	300	125
5	150	....	225	200	25	25	75	300	125
6	125	25	300	150	25	125	....	250	125
7	150	....	250	175	25	125	....	275	125
8	175	....	250	100	25	175	....	275	125

Leaving the coke out, these figures add to 1000 lbs in each case; the weight the charge is always kept.

SLAG ANALYSIS ON MORNING FOLLOWING.

No.	Pb p.c.	Ag oz.	SiO2 p c.	Fe p.c.	Mn p c.	CaO p.c.	Zn p.c.	Dip Assay Silver Ounce.
1	2.25	4.2	42.0	12.7	12.8	17.1	....	588
2	4.00	1.4	36.8	10.2	14.0	15.2	....	340
3	2.5	3.4	45.2	9.4	7.0	....	....	520
4	2.75	1.4	46.8	10.2	6.2	....	....	436
5	2.25	2.7	39.6	14.0	8.0	14.7	....	484
6	1.50	1.6	40.8	9.6	10.0	....	....	220
7	4.5	2.6	38.0	10.	11.0	....	....	292
8	4.25	1.8	39 4	10.5	10.8	....	....	277
9	1.5	0.6	34 5	15.2	7.8	17.4	5.0	68
10	3.5	1.0	28 5	19.5	7.0	18.4	5 8	86
11	3.25	1.2	34.8	15.4	7.8	....	5 2	74
12	1.75	.9	34.0	14.0	7.9	18.8	5 2	80
13	3.0	.6	31 6	20.8	7.0	12.4	6.6	134
14	6.5	1.4	29.6	23.4	6.0	9.5	5.6	92
15	1.5	.9	32.5	15.0	8.2	19.8	6.3	78
16	1.25	.4	34.2	16.4	7.1	....	5.4	116

ORE CHARGE, 9 TO 16.

No.	Kaolin.	Siliceous Iron.	Crude Sulphide.	Iron Ore.	Ironstone.	Limestone.	Sulph. Concentrate.	Slag.	Coke.
9	125	175	325	....	150	225	....	100	125
10	125	125	325	....	250	175	....	100	125
11	100	150	....	50	....	225	425	100	135
12	125	175	325	....	150	225	....	100	125
13	125	125	....	....	250	175	325	100	125
14	125	125	325	....	250	175	....	100	125
15	125	175	325	....	150	275	....	100	125
16	100	150	....	....	100	225	425	100	125

FIRST MATTE FROM CHARGES.

No.	9.	10.	11.	12.	13.	14.	15.	16.
Lead, p c..	36.8	25.5	....	42.0	29.2	58.4	35.4	23.7
Copper, p.c.	4.2	4.4	....	4.2	6.2	3.2	4.0	4 4
Silver, oz..	42 0	29.0	....	41.0	52.0	35.8	33.0	31.0

SAMPLE ASSAYS OF OTHER MATTES.

Lead	39.7	33.7	31.3	32.8	34.4	43.2
Copper	29.6	25.3	27.3	29.2	28.4	23.0
Silver, oz.	195.00	244.00	138.00	163.00	172.00	182.00

THIRD MATTE ASSAYS.

Lead	29.8	32.9	37.9	37.1
Copper	40.0	42.2	35 2	32.7
Silver, oz.	326.00	361.00	179.00	261.00

The ironstone shown in these tables is distinct from the iron ore, the latter being the produce of the mine, analyses of which are given under the head of manganic iron ore, whilst the former was purchased at a cost of about twenty-one shillings a ton. It assayed from 6 to 14 per cent silica and 50 to 60 per cent of Fe. The limestone came from Terrawingee, and assayed from 6 to 11 per cent silica, 1 to 5 per cent of carbonate of magnesia, 1½ per cent ferric oxide iron, the balance being carbonate of lime. It cost fourteen shillings a ton landed on the mine.

Regarded as a smelting ore, the Proprietary ore was satisfactory. Its composition, no matter what part of the mine the ore came from, was such a blending of bases and silica that it smelted very easily, and had some means been provided by which the ore could have been regulated in its fluxing value as it went to the furnaces, as well as its silver and lead value, the mischief caused by irregular qualities of ore would have ceased, and allowed of clean smelting there as elsewhere. The presence of manganese binoxide in the ore was also of assistance, both as an oxidizer for the sulphur, and for its rapid melting qualities. The zinc was never present in the slags in sufficient quantity to cause any mischief. Alumina was the greatest nuisance, and Mr. Blakemore's experience has been that with slags up to about 36 per cent in silica the alumina acted as a base, but usually, as soon as this point was overstepped, the slags immediately thickened up and assumed a most silicious appearance, due, in his opinion, to the alumina changing its functions from that of a base to an acid.

After a furnace has been at work for a day or two all trouble arising from the blowing-in operation is gone, if care has been exercised. The blowing-in crust is some trouble if allowed to form, but as a rule it is great want of attention that allows this to make. It is due to the ashes of the wood, which was thrown in at first to ignite the coke, forming into a solid mass through the first slag formed chilling in it. The mischief of it is that it prevents the lead reduced or added to the blowing-in charge from getting into the well, and unless holes can be driven through it into the lead underneath the latter will chill, and cause trouble, worry, and expense. When the furnace has been running slag for about an hour, the inside can be broken up by introducing an inch-round bar through either tap hole, and running it well into the furnace in all directions with the aid of seven or eight men. The ashes then float out with the slag, and if this is done fairly often for the first hour or two, all danger of a blowing-in crust is avoided. The blast pressure is gradually risen to the point settled on, ten to fifteen ounces usually, and the temperature of the lead in the well soon increases, until, at the end of twenty-four hours, it is usually bright red. With good ore and plenty of water, free from lime or magnesia, the furnace should have a long and successful run.

The largest output of lead that he knows of from one furnace for twenty-four hours was twenty-six tons, 166 tons of charge being smelted to produce this. The ore smelted consisted of carbonate of lead, averaging about 35 to 45 per cent, and was, of course, the easiest smelting ore to be had. This happened at the British mine when he had charge of the furnaces. The week's output of lead at the same time was 167 tons. Carbonate lead ore is no longer found in any large quantities, and it is now carefully hoarded, so that if a furnace produces from five to seven tons of lead a day it is equal to the average output.

(To be Continued.)

Speed Government in Water-Power Plants.*

NUMBER III.

MARK A. REPLOGLE.

Plate III will serve to make clear the effects of power storage in the government of a water power unit.

In Fig. 1 let *a* represent the power supply, *b* the water wheel gate, *w* the wheel, *c* the turbine power, *d* the power storage, *e* the means of changing the load, and *f* the dynamos' power. It will be noticed that full 750 H. P. can be dropped off instantly by closing

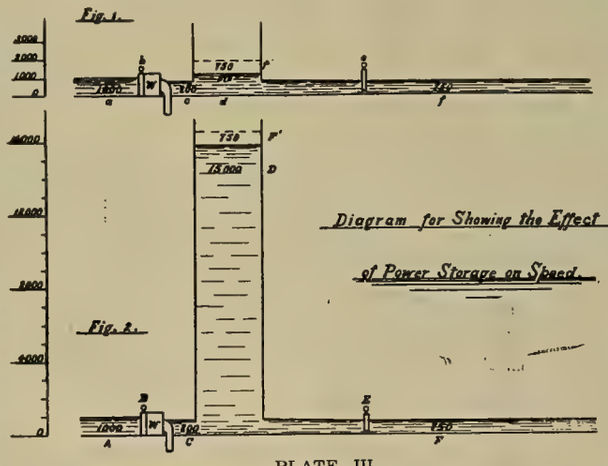


PLATE III.

means *e*. The governor must operate at *b*, and it is cent, hence will theoretically increase the speed of power unit about 2½ per cent by the end of the first safe to say that it cannot be in active operation before one second has elapsed. Note the condition at the end of the first second after the 750 H. P. was dropped. When *e* was closed there was only one outlet for the power generated at *w*, and that was to increase stored energy *d* to dotted line *f'* during the second. This increase will theoretically raise the speed of the whole plant 100 per cent. If it were not for some other principles that step in, this would be the actual speed at the end of the first second. In like manner, if the plant was running empty at normal speed, and 750 H. P. of load were added instantly, the plant would theoretically be standing still at the middle of the first second. Here also other principles step in and change the result somewhat.

In Fig. 2 let *A* be the power supply, *B* the water wheel gate, *W* the wheel, *C* the turbine power, *D* the power storage, *E* the means of changing the load, and *F* the dynamos' power. Please note that all the conditions are the same, except that there is 15,000 H. P. of stored energy in Fig. 2, while there is only 375 H. P. in Fig. 1.

If *E* is closed 750 H. P. will be dropped off, and finds a place at *F'*, increasing the volume of *D* 5 per second. This is also lessened somewhat by the same principles that affect Fig. 1.

It can readily be seen that here is a means of preventing extreme changes in speed until gravity can perform its part of the work. Note the conditions in Fig. 2 if running at speed and a load of 750 H. P. were added.

If the load were suddenly added it must be carried from the reserve power at *D*, using 5 per cent of it during the first second, hence reducing the speed about 2½ per cent theoretically. It can readily be seen that the speed will continue to drop until balanced by new power generated at *W* after the governor has opened gate *B*. It can now easily be seen that *D* in any power plant can be increased until full change in load can be made with very narrow fluctuations in speed. In other words, every foot pound of power or change in load can be intelligently provided for in the construction of a power plant, and variations in speed can be calculated for any change in load if the other conditions are known.

TABLE I.

POWER STORAGE OF SOME WELL-KNOWN PLANTS.

Name.	Units of H. P.	Power Storage Capacity in H. P. for 1 Sec.	Ratio of Power to P. S.
Niagara Falls P. Co	5,000	50,000	1 to 10
Sacramento L. & P. Co	1,000	8,000	1 to 8
San Joaquin E. Co	450	9,000	1 to 20
Portland G. E. Co	600	3,000	1 to 5
Niagara Falls Paper Co	1,200	400	1 to ⅓

Table I will serve to give an idea how the power units of plants differ in the ratio of their power to their power storage. It is safe to say that if the other conditions were equal the possible government in their speeds would show equally as great a difference. Space forbids any further comment, except that each plant is desirous of good government.

TABLE II.

APPROXIMATE LENGTH OF FEED PIPES IN EXISTING PLANTS.

	Head, Feet.	Pipe, Feet.
Ithaca	94	600
Great Falls	40	400
Spokane	60	600
Brantford	30	210
Fresno	1,410	3,800
Niagara Falls	145	200

Ithaca pipe contains 737,500 $MV^2 = 11,800,000 =$ 338 H. P. of kinetic energy in the pipe.

Table II is intended to show the horizontal lengths of feeder pipes of some of the existing electric water power plants.

It is unnecessary to go into the details of the calculations, but the purpose is to show the possible effects of momentum if the water flow was stopped as quickly as an electric load is sometimes dropped. Taking the first in the list, that of the Ithaca Street Railway Co., it is found that the pipe holds 737,500 pounds of water. Assuming that this column has a maximum velocity of 4 feet per second at full load, there will be a pressure of 11,800,000 pounds, or over 4000 pounds per square inch at the water wheel end of the pipe if the gates were closed as quickly as the load is dropped off. Since the static pressure is less than fifty pounds per square inch, and only a reasonable factor of safety provided, it is evident that a serious wreck would be the result of such a quick closing of gates. Yet such is necessary, theoretically, if even speed is desired.

It is also noticed that there is in this pipe before closing the gates 338 H. P. of kinetic energy for one second. Some disposition must be made of this energy, as it is necessary that the column of water be at rest when the wheel gates are closed. The only available disposition of it is to allow it to lo join the power set free when the ad is dropped off, increasing its effect a like amount until the wheel gates can be safely closed.

It can now readily be seen that it is not only necessary to provide power storage capacity enough in a power unit for the changes of load, but also an additional capacity for that contained in the pipes or flumes. This extra power must be provided on opening the gates before the wheel will furnish new power, and must be disposed of before the wheel will stop furnishing power when the gates are being closed. In other words, if the power unit in question is 900 H. P., and calculations were being made to provide power storage so as to allow a full change of load to be made, keeping the speed inside of a given per cent, the calculations must be based on 900 H. P. plus 338 H. P., or 1238 H. P. change at the wheel gates. This makes it clear that closed pipes should be avoided as much as possible, if the government is to be done by changing the flow of water. If it is desired to govern by deflecting the stream in some manner, the only detrimental effect of the long pipe is the power lost or gained by the varying friction in changes of load.

(To be Continued.)

*Journal of the Franklin Institute.

Mine Management and Mismanagement.

TO THE EDITOR:—Having lately read several articles in your paper, and in other journals devoted to mining, in regard to the management, or rather the mismanagement of mines and reduction works, I think perhaps my experience in this section may be of some benefit to your readers.

Some twelve years ago I was sent for to take charge of a large concentrating mill in Santa Barbara, Chihuahua, Mexico. The manager stated that the ore ran 5 per cent lead, 15 ounces silver, average. The mill not being completed when I arrived, I went up to the mine where there was an assay outfit. I stayed there ten days, sampled the ores on the dumps and 1500 cars as they were run out of the mines. Result, ½ per cent lead, 3 ounces silver. On the eleventh day I took the stage for the railroad. The mill was started up; the result I leave to the imagination.

Some ten years ago I was sent for to start up a big concentrating mill, I will not say where, as I am now getting too close to home to enter into particulars. I found a steam stamp of 200 tons capacity, hydraulic sizers, forty jigs, sand grinders for the jig tailings, and twelve Frue vanners. I found the water for the sizers came from a little stand pipe which supplied water for everything else in the mill. I found the ore a copper glance, or sulphide. One blow of that stamp would reduce a piece of the metal to such a fineness that 80 per cent of it would pass a 100-mesh screen. The next day I went to the "mines," twelve miles by a narrow gauge railroad. I found many thousand feet of work. I found perhaps 100 tons of ore on the various dumps; and with a liberal estimate, 100 tons more in sight. I took the train for home the next day. The mill started up and ran for twelve hours. There is no mill or railroad there now.

Some nine years ago I found a sample of ore in the express office, sent me by a responsible firm operating in Sonora, Mexico, asking my advice in regard to the proper way to work ores of that character. I recommended concentration and shipment of the product to a smelter; and specified what I considered the proper machinery for the purpose. I was asked to buy and install the plant, which I did, and in sixteen days run used up every pound of ore they had, or ever have had.

Six years ago, more or less, I was asked to sample a mine, and advise in regard to machinery to work same. I did so, and advised five stamps, plate and vanners. The owner stated that his capital was too small and wanted something cheaper installed. I then advised some kind of centrifugal crusher, and a Huntington mill. These were bought and put in place. I started up the mill, with the result of 52 per cent of values in gold bullion, and concentrates $261 per ton, $1.20 tailings. About a year afterwards I received a letter from the owner, stating that his ore had fallen off in value, that they saved nothing except on the plates, that the vanners were a failure, and to come down at once. I did so, and found the mill run entirely by Mexican labor, except the amalgamator. I found the vanners transformed into bumping tables, and they bumped seven different ways at once. The head pulley bushed down, and the two head roller bearings cut down into the frame so that the field was level, or inclined the wrong way, and the edges torn off the belts. New belts were ordered and put in position, men were found who knew the difference between a vanner and a rawhide, and the mill is running yet; and a letter from the owner informs me that he will increase the capacity of the mill shortly.

About five years ago, more or less, I was sent to sample a mine in Sonora. I found a continuous streak of about 7 inches of iron pyrites and gangue, running $30 per ton in gold; concentrates gave $210 and $225 per ton, and so reported. Three years or so ago, I was requested to go down and start the mill. I found centrifugal crusher, coarse and fine rolls, eight jigs, a 5-foot Huntington mill to crush jig tailings, three hydraulic sizers, and three vanners. I found one revolving screen short. I put in a home-made bump screen in place of short screen. I found water for sizers taken from small stand pipe, which supplied balance of mill, from which boiler feed pump when running would reduce pressure one-half. I built extra tank for sizers, cut off one sizer, and started up on $7.50 ore, costing $2 per ton to haul from mine to mill, with a general manager at $500 per month, secretary $300 per month, superintendent of mine $300 per month, superintendent of mill $300 per month, book-keeper $200 per month, foreman of mill and of mine in proportion, dinner every Sunday, with champagne, all costing not less than $5 per plate. I remonstrated with manager in regard to the value of the ore sent to the mill; was told that it was a stock proposition, and that it was necessary that the mill be kept running, if on waste. My advice was asked as to cyanide method of working concentrates on the ground. I advised against it, as the concentrates carried from 3 per cent to 5 per cent copper. I advised dead roast and barrel chlorination process with chloride of lime and sulphuric acid instead. I received my check and left for home. Since then the cyanide process has been installed; the mine and the mill are now shut down, and a property that would pay from $2500 to $3000 per month, is now lying idle.

Four years or so ago I was offered the superintendency of a mine, operated by English capital, near Bacoachi, Sonora, Mexico. A 10-stamp mill was ready to be shipped from Chicago and the money to pay for same was deposited in a Chicago bank, awaiting a telegram from the general manager, to be paid when the mill would be shipped. Samples of the ore submitted to me gave 1000 ounces and upwards in silver—very much upwards, too, and entirely unsuited to the mill contemplated. I advised the manager to withhold the telegram until we had seen the mine. I found a streak of ore averaging 2000 ounces per ton, from ½ inch to 4 inches in width. I advised careful extraction methods, sorting, etc., and shipment of product to smelter. The result of two years' work on those lines: $30,000 profit to the company, mine abandoned, and at least $20,000 saved by not erecting the mill.

Some two years ago I was sent for to sample a silver mine, and to advise in regard to method of working the ore. I found the finest little silver mine to be found anywhere, thoroughly developed and opened up to a depth of 400 feet. The mine was opened up by three tunnels, driven on the ledge; three ore chutes from the surface to the bottom, running from 500 ounces to 5000 ounces per ton; and between the ore chutes what in any other mine would be waste is ore of an average value of fifty-one ounces per ton. Average width of ore, 10 inches. I advised shipment of rich ore to furnace, as has been and is being done, and roasting and chlorination, and either amalgamation or leaching of the furnace product, as the owner saw fit. The owner went to buy the necessary machinery and fell into the hands of, we will say, Phillistines, who induced him to put up a 10-stamp, wet-crushing mill, with tanks, pans and settlers. Started mill with designer and constructor in charge. Result: less than 1 per cent saved. I was asked to go over and see what could be done. I went, and could only reiterate my former recommendation; and, as he now had stamps, pans and settlers, the installation of a furnace was all that was necessary. I was told that he, the owner, had already spent so much money without any return that he did not feel able to spend the $10,000 or $12,000 required for the installation of the furnace, which I considered necessary, and asked if I could not concentrate the ore. After making the tests I informed him that if he was willing to lose 25 per cent of the values I could guarantee the balance of 75 per cent. I was sent to San Francisco to buy the necessary machinery, installed the same, and the mine is running yet on fillings of old stopes, and saving 77 per cent, as per letter from owner.

On the 22nd of February last, while in Altar, Sonora, on business connected with my vocation, I was approached by the manager of a property owned and operated by foreign capital and invited to go out and see their plant in operation. I welcomed the chance to kill a few days' time and went out with the gentleman. I found a fine concentrating plant, and fine ore to concentrate. I found the mill run entirely by Mexican labor, and among the machinery a lot of vanners; and whenever a belt would run to one side, and, as they never had been adjusted, that was often, a dozen or so Mexicans would grab the opposite side, and, by main strength, pull it straight. I was assured by the manager that the results were satisfactory, and I was transported to Altar, and we parted with expressions of mutual esteem.

A very short time ago I had some ore sent to me for advice in regard to the proper method of working it. I recommended concentration. The ore was of such a character that any kind of fine concentration would answer, and revolving buddles were decided upon because of their capacity and cheapness. They were installed and would not do the work. I was notified, went down and investigated, and had the skeleton corrugated iron covered with Portland cement, as the maker intended, and furnished for the purpose, and the result is all that could be desired.

In view of the foregoing experience, I would ask: "Why is it that the ordinary hard-headed business man in other lines seems to lose all his business acumen and common sense when he goes to mining?" If he was starting a tanyard he would put a practical tanner in charge; or a sawmill, a sawyer in charge; but, when he tackles mining, any old, or young, thing will do for manager.

Mining is just as legitimate a business as any other, and, in point of fact, the profits are surer than in any other, if the manager knows enough to drop a mine when it is no good. The trouble is, a manager will generally keep on sinking, drifting and crosscutting long after the humblest man in the mine knows it has played out, hoping to demonstrate his capability by a new strike.

My experience has taught me that in the majority of cases failures in mining and milling are caused by trying to make an ore fit a process, instead of, in the first instance, installing a process to suit the ore; and that a misfit manager is extremely liable to install a misfit process. CHAS. TAYLOR.

Nogales, Arizona, May 15th, '98.

The Mining Engineer.

TO THE EDITOR:—Is mining engineering a trade, or is it to be dignified by the title of a profession? That is a question which American mining engineers should answer at once, and emphatically. By American mining engineers I refer to those men who have spent time, money and labor for a degree from a reputable college. Such a man, by his conduct, has indicated an ambitious desire to obtain for himself scientific standing. If any man of ordinary intelligence and opportunity, after having passed through the stages of shift boss, underground foreman and finally manager of a small mine, is to be allowed to assume the degree of mining engineer, then it is no longer a degree, the profession becomes a trade and the degree a name. A trade represents manual skill and dexterity, while a profession implies knowledge. I say implies, for it does not follow that the mere possession of a college degree is proof positive of a knowledge of the profession; but it should indicate the completion of a thorough and systematic knowledge of the theory of the profession. A degree should represent scholarly attainment, and success should signify practical knowledge also, for success is properly applied theory.

The mining fields of all the world possess two kinds of mining engineers: 1st. The mining engineer who has both the scholarly and practical education in his profession. 2nd. The so-called "practical M. E."

Of the first suffice it to say he soon proves his worth and is found at the top of his profession. He rarely signs his name with a degree attached, excepting in the case of a scientific paper, where a proper appreciation of a degree is to be expected. The second class are personifications of a paradox, for they claim to have derived their dexterity and manual skill from practice alone, yet they assume the degree of M. E., which should indicate theoretical training as well, and then they spend the greater portion of their time railing against the scientific miner. It is true that either theory or practice is a poor thing alone. We have all met the college "expert" in the mines and heard him dilate in extenso on the rare mineralization of a piece of gouge. He is to be pitied, for he lacks the essential that he cannot assume, and for want of practical knowledge he soon finds he must start on half wages driving a drill or forever give up his bright ambitions in the line of mining.

Now, take the case of the "practical" miner. Have we not seen him in the office of consulting engineer, where he is equally to be pitied with the poor college theorist, whom he often scoffs? Have we not condoned his sorry attempts at a Cam course? Have we not seen him put lime in his mortar boxes "because somebody else did" and "because it gave a higher extraction," when the same result might be arrived at by greasing his guides less? It must be admitted the "practical" miner is as hopelessly deficient as the object of his derision—the college theorist. There is no room for either in the field of mining engineer, and by "mining engineer" I mean true M. E., or consulting engineer, which does not mean simply a surveyor or sampler. The theorist makes a good draughtsman, ordinary surveyor or assayer. The "practical" man makes a good manager under a consulting engineer, and, if he properly understood the position, the consulting engineer is required to fill, he would not be so presumptious as to assume the degree. I say he does not understand the position, for he is told to put a certain timber in a gallows-frame. He knew before that the timber was necessary, and could have ordered it and put it into place without the advice of the engineer—so the situation appears to him—but he has not seen the calculation of the stress on that timber with a certain amount of ore in the bins. He is totally obvious of all this theory, and assumes the title of "M. E." because he can do what he thinks the genuine mining engineer has done when he has misjudged the responsibility of the real engineer.

The American engineer does not see the seriousness of this misrepresentation until he goes into a foreign mining field. There he sees that he has worked for years in college and then gone out into practical mining and worked underground as a laborer, then written scientific papers in order that he may have conferred upon him a degree which is an object of derision. He sees a mine abandoned because of bad management, and on inquiring the reason is told that they must have had a "mining engineer" for manager. So it has become a fact that real mining engineers are rarely known as such on foreign mining fields because, as before stated, they rarely sign the degree after their names excepting in the case of scientific papers. The men who bring odium on the degree are the self-styled engineers, who are not engineers at all. It is another case of the thief calling himself a preacher.

The real American mining engineer is known in foreign fields as the "Yankee expert." His ability is at the highest premium, he is all that a mining engineer should be, he has scholarly attainment, he has practical ingenuity, business sagacity and is a skillful manager, but he has to distinguish himself from those who represent themselves to be what

they never can be; he is a "Yankee expert" and not a "mining engineer."

Such are the facts, and the need for a remedy is obvious. How? is the question. There is only one answer: For the legitimate mining engineer to lose no opportunity to brand the impostors, and to organize with this end in view if no other method succeeds. The necessity is great, for the American mining engineer must maintain the prestige which he has won in foreign fields in the face of nameless difficulties and unspeakable hardships.

G. B. WILSON.

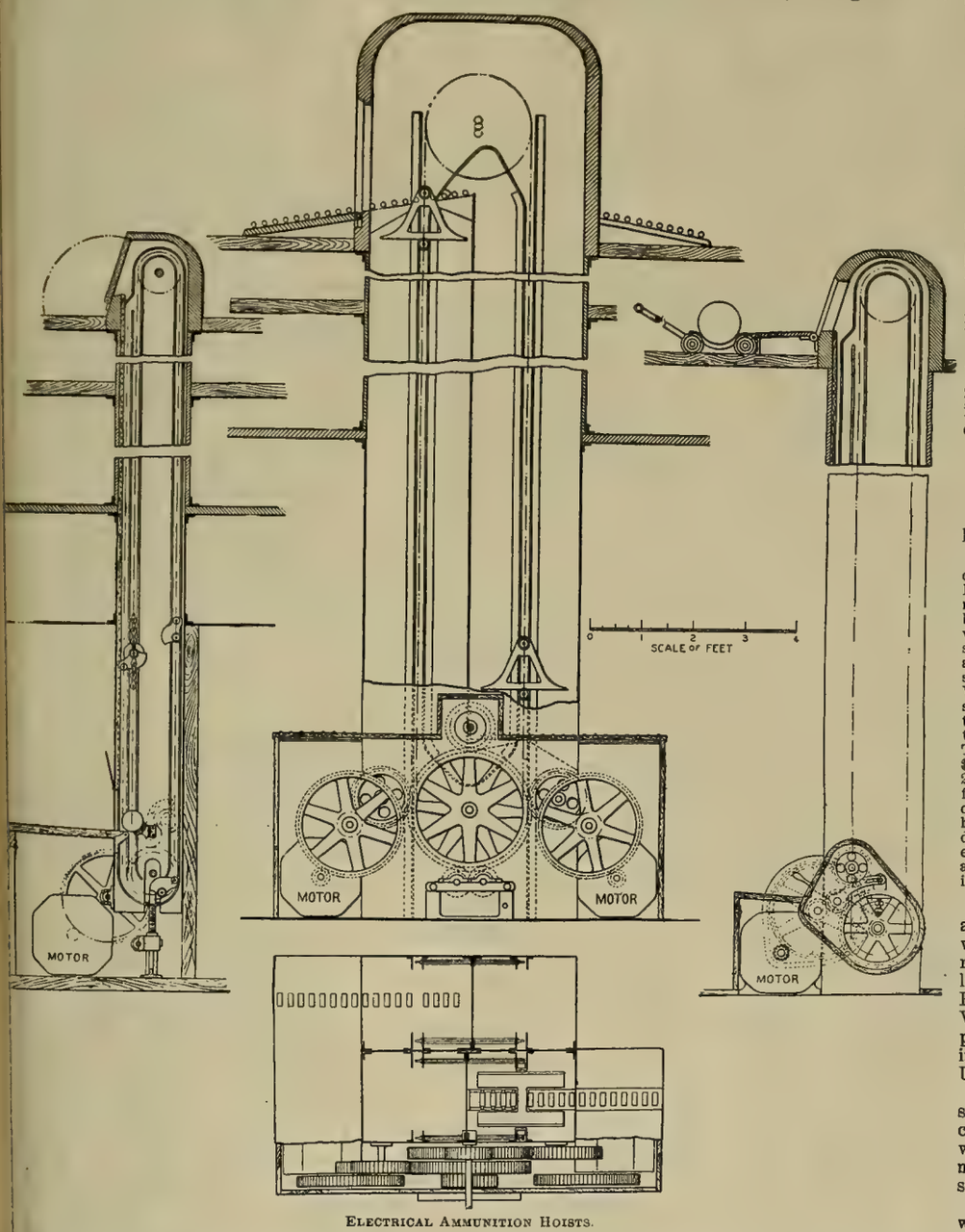
Coolgardie, West Australia, March 24th, '98.

Electrical Equipment of War Vessels.

Coupled with the name of Dewey, probably no names have been for the past month in more frequent use than those of the vessels built in San Francisco by the Union Iron Works—the Olympia and the Oregon. Like the San Francisco, the Charleston and the Monterey, they are provided with electrical equipment which greatly adds to their efficiency. Power transmission on war vessels is a prest prominent factor in their mechanical equipment, d the present conflict offers fair opportunity for a ucial test.

Electricity enters prominently into present naval uipment, as do steam and compressed air, the mer being the favorite with most naval officers d constructors. Referring to the electrical de- es on the vessels named above, it is also to be ted that other nations are no less alert to the up- date achievements of science. Herewith are illus- ated electrically operated ammunition hoists aced by Geo. W. Dickie, of the Union Iron Works, the Japanese cruiser Chitose, the electrical sys- n of which is on the two-wire plan, operated at hty volts. There are ordinary service circuits d battle circuits, the latter being run under the otected deck. All wires are covered with extra avy rubber insulation, protected by braid soaked in waterproof compound. Through boiler and engine compartments the wires are in iron armored conduits; elsewhere, except the running light circuits and those running up masts, the wire is in wood moulding. All of these hoists are of the continuous running, endless-chain type, delivering on the gun deck through armored hoods, as shown in the illustration. The traveling carriages are suspended on flat link chains, working over sprocket wheels. The carriages are guided on each side by rollers working in guide rails.

The hoists are fitted, if necessary, to discharge on the deck below the regular discharge, this arrangement being indicated on the drawing. The object of this provision is to be able to serve the guns through ammunition scuttles by hand from below at close quarters, when the upper decks might be swept by the fire of machine guns. Current for the hoists is taken from either of two mains—one for the forward hoists and one for the after hoists, leading from the dynamo-room through iron armored conduits. These two main feeders will be connected to the main switchboard in such a manner as to be supplied by either dynamo singly or from dynamos operating on lighting circuits. Each 8-inch hoist is capable of delivering three rounds per minute to its respective gun. A round consists of one shell and two powder tanks, each being handled separately. The interior of the hood is fitted with a drum mounted on the sprocket-wheel shaft, as shown, having a recess to receive the charges and so arranged as to close the opening except at the instant of discharging or receiving a charge, an important and necessary function, as the principal danger of derangement to this kind of ammunition hoist, is from splinters and debris getting into the hoist casing and wrecking the moving points. All doors in the armored hoods are water-tight when closed, and are arranged to act when open as discharge or feeding tables for the ammunition. The introduction into modern ships of war of quick-firing ordnance up to 8 inches has made the serving of ammunition one of the many difficult problems that confronted the naval architect and the engineer. It also gives an idea of how long a naval engagement will last between modern ships, if they have a chance to do their best, to consider that a ship equipped as the Chitose will be can fire all the ammunition she can carry in two hours.



ELECTRICAL AMMUNITION HOISTS.

Supreme Court Decisions.

At Washington, D. C., this week three cases of some general interest to miners have received final adjudication. They settle the question of the right of the owners of a mineral vein to follow the vein outside of the territory covered by the surface area of location. The first case was the Del Monte Mining Co. vs. the Last Chance Mining Co., the property involved being located in the Sunnyside district in Mineral Co., Colo. The decision was not upon the merits of the case, but in response to questions certified to the court from the United States Circuit Court of Appeals of the eighth circuit, where the case is now pending. There were five of these questions, but only three of them were answered.

The first of these questions was: "May any of the lines of a junior location be laid within, upon or across the surface of a valid senior location for the purpose of defining or securing to such junior location underground or extra lateral rights not in conflict with any rights of the senior location?" This question was answered in the affirmative.

"If the apex of a vein crosses one end line and one side line of a lode mining claim as located thereupon, can the locator of such a vein follow up its dip beyond the vertical side lines of his location?" This was also answered affirmatively.

A question which was answered in the negative related to the side line of another claim, the New York.

Another mining case was that of W. A. Clark vs. William Fitzgerald and others, covering Montana mines, involving the same question as was presented in the second question as given above. The opinion of the Montana Supreme Court was affirmed.

Of Evident Interest.

In the issue of Aug. 29th, '96, appeared the following:

An improved bit to be used with an ordinary well-boring outfit for sampling gravel mines, which was made by E. H. Benjamin of this city, has done considerable to bring that method of examining gravel into favor. Instead of the usual bit used, which dragged and scraped, Mr. Benjamin made his with a longer point, thrown forward, so that it would cut instead of scrape. The bit takes on the shape of a plowshare, and the gravel may be brought up in large quantities for sampling. About this is fastened a "barrel" of sheet iron. Whenever hard rock was struck an ordinary churn drill was substituted. Mr. Benjamin states that in sinking holes on the Old River mine in Placer county, to locate the channel, two-fifths of a cubic yard would be brought up each time. The total cost of the well-boring outfit need not exceed about $200. While with the bit generally used in well-boring but 25 feet per day could be dug, with this it is claimed that 70 feet of holes may be sunk without any extra labor. The value of this method in locating channels or sampling gravel to be hydraulicked will be apparent to miners. The old method of digging shafts or running tunnels or drifts was not only very expensive, but at best could give no ideas of values over large areas. On the Old River mine 120 holes were sunk in locating the channel at an expense of not over $600.

It was rightly judged that the importance of such a device would be speedily recognized, but the editor was hardly prepared for the flood of inquiries and requests for further information that came from, literally, "everywhere." From St. Petersburg, Bombay, London, Luzon, Johannesburg, Coolgardie, Venezuela, Chile, Ottawa and innumerable other points outside the United States have been received inquiries. From every gold-bearing State in the Union requests for more explicit details have come.

This paper has tried to get from the inventor a sketch or some description from which a sketch could be made, or some details of construction, but without success, and refers to the matter here merely to give the reason why nothing more has been said about it.

The following is a letter under date of May 16th, '98, written to a California miner, whose inquiry addressed to the MINING AND SCIENTIFIC PRESS was referred to Mr. Benjamin:

I do not manufacture or sell the auger. I have made several successful examinations of gravel beds and old channels with a boring device of my own invention that I made myself. It is similar to an ordinary artesian well outfit—my improvement, consisting simply of a detachable bit, shaped something like the bit of a common plow—which will cut cemented gravel or other hard ground. I have never had it put on the market, as its use would never become common enough to pay. Truly, EDWARD H. BENJAMIN.

That the device suggested would be of universal value is manifest; and while Mr. Benjamin's well-known modesty might lead him to disclaim any efforts to make him famous, yet, in the interests of mining in general, it would be a matter of regret were so practical and useful an idea allowed to die with him.

MANGANESE ORE, while not abundant, is producible in several parts of this coast; some of the California ore carries up to 65% binoxide of manganese; it has to be rich to stand shipment, as the local demand is very light, chiefly in the manufacture of chlorine gas.

Treating Oxidized and Pyritic Gold Ores

P. H. VAN DIEST.

If all the free gold in pyritic ore is removed by amalgamation and the remaining pyritic ore ground up with mercury, some of the "not attacked" gold will be extracted from the pyrites, and the longer the grinding is prosecuted the more gold will be obtained. If, however, the pyrites are calcined until all the sulphur is driven off, the gold can be completely extracted by the means of mercury.

The mercury, to amalgamate actively, must be pure. To remove suspended impurities from small quantities of mercury, shaking with crushed loaf sugar is recommended. Larger quantities, where amalgamated impurities are contained, are best treated in a bottle or stone jar having a stop cock at the bottom, with diluted nitric acid, and stirring with a glass rod now and then, during a few days, thence draw off the required amount for amalgamation.

Pure mercury must make perfect round globules and leave no trail when run down an inclined glass plate. Gold amalgamates freely with pure mercury at ordinary temperature, when the gold is porous, or rather when its molecules are at uniform distances apart. Heavily pounded gold will not amalgamate freely, but, after annealing—that is, heating—it does so at once. For this reason grinding of the ore is in many cases better than pounding under stamps, i. e., slow stamping with high lift.

Treating the ore under heavy stamps with low and fast-drop, with quick discharge, when the rock is cracked as a nut without pulverizing the kernel, is yet the cheapest way for handling large quantities of rock. However, in that form the stamp battery is not an amalgamating machine—that is, no amalgamation can take place inside the mortar, and this must take place entirely on the plates outside.

No large lumps should be fed in stamps or in any other kind of mill. As a rule, the pieces should be broken to a size that will pass through a ring three-fourths of an inch in diameter. The best method is to break the ore near the mine in crushers separate from the mill, to prevent uneven steam pressure on the mill engine and to prevent jar to the amalgamating plates and other machinery in the mill.

The fineness of screens through which the pulp discharges from the battery depends on the character of the ore. If most of the richness is in pyrites, coarse screens, 30 to 40 mesh per square inch, is recommended, principally to prevent sliming in concentrating. If the gold occurs free in the quartz and the pyrites contain less value, finer screens, 50 to 60 mesh, should be used.

The tables outside the battery on which the amalgamated copper plates or electro-silvered plates are fastened, must be made free of the jar of the battery, be perfectly level in crossway direction, exactly fit to the table and be secured by means of wedges or cleats, but not with screws or nails. If the gold in the ore is coarse, short tables 8 or 9 feet long should be used. If the gold is fine, larger tables, 15 or 16 feet long give better results.

It is better to work with a small water supply and a high inclination of tables than under opposite conditions. Enough water should be supplied to make a thinly fluid pulp, never leaving dry places anywhere on the plates. Fine crushed ore requires more water and less inclination of the table than coarse-crushed ore. The water supply must be in any case such that sand can nowhere settle upon the plates, but is kept in motion in regular waves across the table. One-inch grade per running foot of the table is about an average grade. The amount of water used differs considerably with the kind of ore and mode of crushing. It will vary between 80 and 140 cubic feet of water per ton of ore crushed. The temperature of the water should be kept as much as possible between 60° and 70°, Fahrenheit. Lower and higher temperatures retard the amalgamation.

It is advisable to use mercury traps at the end of the table, so constructed that the pulps must go down to the bottom of the box traps and rise again, so that all the stray particles of mercury and amalgam be caught before reaching the concentrating tables and being lost with the tailings.

Besides, a mill should always by floored very substantially with a gentle slope and a gutter in the center to catch stray particles of mercury and amalgam.

The loss of mercury should never be higher than 0.03 pound per ton of ore. In several mills it does not exceed one hundredth of a pound per ton of ore. Mercury should be fed to a quantity of about three times as much in weight as that of gold supposed to be in the ore. When inside amalgamation takes place the mercury should be fed at regular intervals once every two or three hours into the mortar box.

The condition of the escaping amalgam through the screens as caught on the upper part of the copper or silvered plates gives a valuable indication as to the process of the amalgamation, and whether the proper amount of mercury has been charged. If it is brittle, granular and crumbles under the fingers, not enough mercury is added to the pulp. If thin, soft or pasty, too much mercury is used. The best way of feeding is with a wooden measure holding about one-half ounce of mercury, and dip this in a bottle, closely stopped, holding three to five pounds, drawn from the purifying mercury tank, and adding a little sodium amalgam, a piece the size of a pea to every pound.

The pulp passing through the mercury traps should be distributed over the concentration tables to separate the pyrites and other minerals from the quartz and clay gangue of the ore. The best way is to classify the pulp by using hydraulic separators, causing the coarsest particles to go over bumping tables, vanners or shaking tables and the finer material over slimers or puddlers.

For the treatment of the thus obtained concentrates different ways are open. If the mill is near a railroad, and not at too great a distance from a smelting center, shipping to a smelting plant is the best, and thus the greatest value for the gold in the concentrates can be obtained, smelting charges for pyritic concentrates, free from zinc, being low. If the cost of transportation is high on account of distance, it is advisable for a small mill, producing from one-half to two tons of concentrates per day, to roast them in heaps or stalls and run the roasted material through the mill again, or in pans with mercury. When the daily production of concentrates is greater it will be found more economical to treat them either by chlorine or cyanide. Chlorination gives the greatest extraction, but requires, previously, a complete roasting which increases the cost of treatment.

For cyanidation, gold must be very finely divided in the concentrates to be effective, but no roasting is required. If lead in ores to the extent of 7 to 10 per cent of the mass of roasted pyrites can be obtained, or 1½ to 2 per cent copper in ores be added to the amount of pyritic concentrates obtained, smelting or concentrating into lead bullion or an iron-copper matte is advisable. Matte smelting is preferable because matte is in a much better form to ship than concentrates, besides loss of gold in matte smelting is always much less than by chlorination or cyaniding; and, when the pyrites can serve as fuel, is cheaper.

THE Oregon is reported safe at Key West after a 13,000-mile trip from San Francisco where she was built. After such a long run it is announced that she is not in the slightest need of repairs of any kind, which is flattering comment on Pacific coast shipbuilding efficiency. The battleship Oregon is the heaviest armored of any ship in the world and in size is the same as the battleships Indiana and Massachusetts, these three being the largest in the American navy. The steel plates on the armor belt, barbetees and turrets are 17½ and 18 inches thick. She has four 12-inch guns and eight 8-inch, mounted by pairs in turrets. The size of these 13-inch guns may be imagined when compared with the guns of the Monterey (another San Francisco built vessel now lying here but ordered to Manila), which are 10-inch. There are four 6-inch guns mounted in broadside, twenty 6-pounders, six 1-pounders and five torpedo tubes for Whitehead torpedoes. The vessel's displacement is 10,288 tons; length over all, 864 feet; extreme beam, 70 feet; draught of water, 27 feet 8 inches. Her coal capacity is 1594 tons. The Oregon is rated a first-class battleship and has been in commission since July 15, 1896.

Mines at Mercur, Utah.

B. T. Lloyd of Salt Lake City and associates of Chicago purchased a few weeks ago a controlling interest in the Old Fred property at Sunshine, near Mercur. The price was on the basis of $80,000. The property has four distinct veins paralleling each other. Mr. Lloyd states that the mine is to be developed.

The Overland, in the same locality, has two shafts 170 feet and 160 feet respectively, and 7000 feet of drifting. Plans are made for a cyanide mill.

E. A. Wall has been prospecting on the Glencoe property, on the Sunshine side of the Mercur district, under a bond and lease from Durgy & Raddatz. This property has large bodies of ore, but of very low grade.

Judge Green and associates of Oakland, Cal., are sinking a prospecting shaft two miles from the foothills, in Rush valley. Their purpose is, if possible, to tap the west dip vein which outcrops where the La Cigale and Daisy are located.

The Daisy, under the management of A. H. Mayne, has a 450-foot shaft, which follows the dip of the vein of 52°. From this shaft levels are run at each 100 feet. At each of the four levels is an ore bin capable of holding 100 tons of ore, from which ore cars or skips are loaded and raised automatically to the bins at the mill. The mill is equipped with crushers, rolls, carriers and tanks for cyanide work. The eight tanks have a capacity of 300 tons per twenty-four hours. The mill, which is just being finished, will doubtless be operating by July 1st. The work on the levels aggregates 2000 feet. The vein runs in width from 2 to 25 feet. It is stated the ore averages $6.50 per ton and that it can be mined and milled at at $1.50 to $2 per ton. The hanging wall is a porphyry, overlain by a black clay shale, the footwall being limestone.

The La Cigale vein is in the same formation as that of the Daisy, but farther north. This property was described in these columns last August. Since that time the underground workings have been extended considerably, but the cyanide mill, which is well equipped, has not been running. The delay has been to await the result of some experiments. It has been decided to add to the mill a roasting apparatus. There are certain elements in the ore which have to be eliminated by roasting.

Near the crest of the mountain, separating the West Dip from the Mercur district proper, are the Northern Light and Chloride Point mines, both equipped with cyanide mills. These mines are on what is known as the silver stratum of the Mercur district. It is a ledge of chloride ore in which silver values preponderate, and which is imbedded below the main gold ledge of the district between limestone walls. The gangue rock is quartz, with some clay and talc. The mill at the Northern Light is running its full capacity of forty tons per day. The Chloride Point mill, which is claimed to have a capacity of 100 tons per day, has not started up yet. It will be operated by electric currents from the Telluride power plant at Provo.

The Mercur mill, located at Manning, is running at its full capacity of 300 tons per day. It has fifty-seven solution tanks, with three-fourths inch screens. It uses 300 pounds of cyanide per day. It runs exclusively on ores from the Mercur mine. WASCOTT.

Mercur, Utah, May 19th, '98.

Strength of Wire Rope.

Exhaustive investigation into the resistance of wires and wire ropes, both as regards tension loads and bending action, has been made at the government testing laboratory at Berlin, intended to investigate the resistance both of single wires and of the same wires twisted into rope. In general the following deductions were made: The endurance of wires under repeated bending over a uniform radius of curvature diminishes rapidly with the increase of load up to loads of about 6000 pounds per square inch, but for further increase of load the reduction in endurance proceeds more and more slowly. The endurance under repeated bending from increasing loads, diminishes the more rapidly the less the resistance and the greater the extensibility of the material. The influence of increasing radius of bending upon the endurance was rapid at first, but showed a continually diminishing importance above fifty diameters of the wire.

These tests, as well as the tests of wire ropes, were made upon wires of various strengths, in order to obtain a progressive series of points through which curves could be drawn. The tests with the ropes were made upon the materials used for the single wires, so that a series of relations between a given wire and a rope made from the same wire were established. In some instances the strength of a rope per unit of cross-section was greater than that of the single wires of which it was composed, but in others it was much less, depending upon the material and the conditions of test. This work was undertaken especially to furnish data for the use of wire rope in connection with the mining industry of Germany.

Rubber From Corn.

Chemists of the Glucose Sugar Refining Company claim to have discovered a process for vulcanizing the oil from corn in such a manner as to produce rubber. They say this will revolutionize the rubber trade and give them control of at least the manufacture of bicycle tires. Five chemists in the employ of the company have been working on this innovation for some months past. According to reports, the chemists have found that the oil of the corn properly treated and vulcanized is superior to that of the product of the South American rubber tree, is more resilient and more lasting; and it is said that the manufacture of rubber under the new process will become an important part of the business of the glucose company. The process was accidentally discovered some months ago. It is also said that the new process will greatly lessen the cost of rubber, especially that variety that is used in the manufacture of bicycle tires, which is required to be thin, durable and resilient. It is claimed that the new variety of rubber will withstand much more pressure than that now in use for tires and that it will offer more resistance to outside force.

LIGHTING the pyramids of Egypt with electricity and the installation of a 25,000 H. P. plant, to cost some $400,000, is a plan now under consideration by the British Government, and an American firm is reported as likely to receive the contract. As outlined, the plan includes the generation of electric power at the Assouan falls, on the Nile river, and its transmission a distance of 100 miles through the cotton growing districts, where, it is believed, the cheap power will permit the building of cotton factories. It is planned to use the power to illuminate the interior corridors of the pyramids, and also operate pumping machinery for irrigating large areas of desert along the Nile.

Mining Summary.

CALIFORNIA.

Amador.

The shaft at the Amador Queen is down 1000 feet. A drift is being run from the 300 level in ore, and Gen. Mgr. Dye will make a test run of it.——It is said that in the Central Eureka, at Sutter Creek, a fine body of good ore has been found.——The Sutter *Record* says that at the Potazuba mine the north drift is in over 300 feet and the ore vein is increasing in size.——The *Dispatch* is informed that the Iron Mass is idle, preparatory to sinking the shaft. The Iron Mass has proved itself to be, so far, as good as its owners expected.——Col. Ranlett, owner of the Copper mine at Newtonville, is sinking a shaft on a chimney that has not been prospected. There is a report that he will start up the old works in a short time.——The Iron Bound, or Douglass mine, near Volcano, is being steadily worked and good ore prospects obtained. A hoist is being put up on the old Soracco shaft by this company, which proposes to clean out the shaft to its depth of 450 feet and drift back to the Douglass shaft.——At the Ivanhoe, near Plymouth, J. A. Brent is adding fifteen stamps to the five in operation. A new hoist will be put up and sinking will be started within a few days. The shaft is down 225 feet. Steam power will be used.——The *Republican* says there is a prevailing idea that the Anita will be the next mine in Jackson to put up a mill.——Very hard rock was struck in the Amador Queen No. 2, which caused slow sinking. The rock is softening and the regular average work per day is being done. The shaft is down 430 feet. Supt. Phillips will put in machine drills as soon as they can be worked to advantage.

Butte.

It is said that the Chinese Co. that leased the Big Bend Co.'s ground, near Yankee Hill, two years ago, will operate on the river this summer.——M. Clark & Co. are developing a claim on the North Fork.——Clark & Co. are working their channel claim.——Farley & Scott are getting their claim in shape to make a good run this summer.——It is reported that pay gravel has been struck at the old Buchanan Hill mine.

Calaveras.

At West Point the Oriental will make a shipment of sulphurets this week.——J. Barnhart & Co. had six tons of rock crushed from their claim. It netted over $46 per ton.——Developments on the Harrison continue. Supt. Musgraves is milling twenty-five tons as a test. It is reported that the plates are looking well.——Sterling Bros. & Co. are crushing Wide West rock. It contains a large percentage of sulphurets. The concentrates will be shipped.——The Eaton G. M. Co. of New York has commenced operations on property near town. A double compartment shaft is being sunk. It is the intention of the management to add machinery in the near future. O. Eaton is Supt.——Manly & Gibson have their mill in operation and are crushing ore from their own property. They have a good-sized ledge and enough quartz in sight to keep the mill running for some time.

Sulphurets from the Keltz mine at West Point, at a depth of 650 feet, assayed $800 per ton. The lead in the Keltz is about 20 inches wide and the rock assays $50 per ton. The work of shipping the ore has begun.——The Oriental is working under the management of J. M. Burns.——O. F. Eaton has put men at work on his mine.——The Champion mine has resumed operations after a lapse of nearly twenty years. Twelve men are at work. A new gallows-frame has been erected, the shaft has been cleaned out and retimbered down to the water line and a new 6-inch pump placed in position. A 2-stamp, triple-discharge mill is nearly ready to run. A portion of the old dump has been sorted, yielding a number of tons of first-class ore.——The Machu mine is producing good ore. The Supt. is H. C. Woodrow.

The Paragon, Keltz and Empire are working a dozen men each.——The south shaft of the Gwin is unwatered to a depth of 85 feet lower than the old 1200-foot level, and pumping is still going on. No. 2 station pump is now being put in on the 1200-foot level. Some good ore is being mined at the 1400-foot level. A rich strike is reported on the 1000-foot level running south, toward the old workings.

El Dorado.

(Special Correspondence).—Whilst little has been said concerning the dearth of water in this county, we will be obliged, like some of our neighbors, to share a like fate. The Gold Bug M. Co., which has installed an extensive plant near Georgetown, after two years of preliminary work finds itself obliged to await the snows and rains of a future season.

The organization of a company is announced that will begin work on the Ida Mitchell and Gold Bug quartz properties in the heart of the town of Placerville. Both properties have yielded considerable gold, but were never worked to any great depth, nor with much system.

Work has begun on the Crown Point group, recently sold to a Scotch company.

Pascoe & Secomb are working the old Jeffreys gravel mine and meeting with success.

W. G. Sheffield of St. Louis bought the surface plant of the Pocahontas for J. B. Mellor of the same city. A renewal of the option on the mine can be obtained and it is quite probable that work will be resumed shortly, though so far as Mr. Mellor is interested the purchase was purely speculative.

Placerville, May 24th, '98.

E. M. Dunker is taking out good milling ore near Sweetwater.——H. Carey is running a 2-stamp mill on high-grade ore near Josephine.

Republican: Most of the men working at the Taylor mine were discharged and the force cut down to eight hands. The impression has got out that the mine has been sold to an English company and the cessation of work is merely preliminary to whatever changes the mine owners wish to make in the working of the mine. The Taylor mine has been steadily operated for a long time and has reached the depth of 1258 feet.

Kern.

The Rand Mountain mine is one of a score or more claims on Rand mountain, owned by the Yellow Aster Co. The regular income of the Rand mine each month for the past three months is said to have been over $40,000, and some months considerably more. Much more ore could be taken out if milling facilities were more extensive. At present 1600 tons of ore are mined monthly by the Yellow Aster M. & M. Co. The ore from the Rand, which is milled at Garlock, averages considerably over $30 to the ton. Plans are now being drawn for a big mill to be part of the Yellow Aster plant. Thirty stamps will be the first capacity of the mill, and steam power will be used. It will be arranged to add more stamps up to 100. The ore is said to be improving.

There has been a good strike of copper in T. Johnson's mine near Randsburg, at a depth of 162 feet.——Work has resumed on the Merced mine.——The first carload of ore shipped to the new mill at Barstow was shipped from the Kinyon mine last week. The car contained fifteen tons.——A number of men were discharged from the Yellow Aster group owing to the lack of milling facilities. The company has quit milling at Garlock, and it is said they intend to send much of their ore to Barstow as soon as the new mill begins operations. In the meantime the mill at Johannesburg keeps five stamps dropping on Yellow Aster ore.

Mono.

Foch & Johl are developing a property near Bridgeport.

Nevada.

(Special Correspondence).—The Phœnix M. & I. Co., that resurrected the old Sneath & Clay mine, near Nevada City, are meeting with good success in their work. This mine had been abandoned since 1868 and was consequently flooded. The property was taken up by the present company on the merits of its early history. The depth reached in its early work was 450 feet. The present company unwatered the shaft and began drifts on the bottom level. They have found a 20-inch ledge of very fair grade ore, the lowest of which mills $17 per ton. The property is operated by an Eastern company and Dr. Tickell of this city. H. K. Shockley is Supt.

Nevada City, May 24th, '98.

Placer.

(Special Correspondence).—The starting up of the mill and cyanide works of the Forest Hill M. Co. notes the point of change in the nature of the mining on which this town is dependent. The marvelously rich drift mines that in the aggregate yielded about $25,000,000, are no longer gold producers to any extent, many of them being completely worked out and abandoned. Forest Hill has never hitherto been considered a quartz mining district, being supposed to have only placer mines. In early days, in the '50s and '60s, some quartz ledges in Volcano canyon, between Forest Hill and Bath, were worked, and the quartz crushed in small mills and hand-mortars. The ore is said to have been high grade, but placer mining gave so much larger returns that the quartz mines were abandoned; and in time it came to be believed that they were abandoned because they were only pockets and worked out by the old miners. One of these mines is the property of the Forest Hill Co. It has before been known as the Spanish mine, because owned by Spaniards. It was supposed to be a porphyry dike containing pockets that were very rich. The Spaniards washed the surface of the ledge off by sluicing and hydraulicking, and worked some rich rock in arrastras. The experts who have examined it for the Forest Hill Co. say that it is not a porphyry dike, but a true lode of a new kind of gold-bearing rock. The dike or lode is from 50 to 200 feet wide in serpentine walls. All of it contains some gold, but the mill failed to save the gold by amalgamation. Seven-eighths of it is said to have been lost with the tailings in the first run made. The Forest Hill Co. claim that the loss of gold was because of its extreme fineness and flour character, and that tests made by the cyanide process show that it can be entirely saved by that process. The mill capacity has been increased to thirty tons daily and a cyanide process works constructed. The successful operation of this mine will make up some of the drop in annual gold production of Placer county, due to the working out of the drift mines, and it will keep Forest Hill town up to its old importance as a mining camp. The amount of ore in sight in the lode cannot be worked out in twenty-five years, even with the cyanide plant built up to 400 tons a day capacity, as promised by the company.

Forest Hill, May 25th, '98.

Bassett Bros. of Oakland have begun work on the Mountain View mine near Auburn. If tests prove satisfactory they will build a mill and put in concentrators.—— Development work is being rushed at the Marguerite mine.——The Jupiter M. Co. will begin work shortly on their gravel property near Iowa Hill.

Herald: C. H. Porterfield is pushing work on his mines near Emigrant Gap. His steam power plant is completed and the 10-stamp mill has started. He has thirty men on the pay roll and will keep the mill going steadily. There will be a great deal of prospecting done in the high Sierras this season, as there is no snow to speak of and prospectors have been on the ground for some time past.——New machinery will soon be erected on the Evening Star mine on Rock creek. Thus far the prospects have been encouraging and the indications are that the Evening Star will be one of the regular producers.——E. W. Chapman is making preparations for the opening up of the old Calf Pasture mine on Rock creek.

Plumas.

The Drury mines, near Quincy, are yielding well. The ore is averaging $8.50 per ton.——The Golden Channel Co. has concluded to sink a larger shaft.——R. M. Green of Oroville bought the Lodge interests in three mining claims near Buckeye and leased them to T. G. Harrison. The lease is for one year and the lessee is to develop the mine and work the ore. The mill will be running in a month or five weeks. The improvements on this property consist of two shafts and two tunnels, one of which is run in on the ledge about 190 feet and the other is a crosscut 60 feet. This tunnel will be pushed ahead night and day. Present developments show a ledge about 18 inches in width which assays $25 per ton free gold and sulphurets, which assay $150 per ton.

Twelve men began work last week on Minerva Bar, near Onion valley.

San Diego.

Development is progressing on the tin mine of D. B. McIvers at Poway. Its area covers about five acres on the surface. No effort has been made to place the property on the market. The assays of the ore show 5 per cent tin.

Shasta.

O. La Plant at Keswick is developing a 5-foot ledge of ore that mills $20 per ton.——The Milk Maid mine at French Gulch, with four stamps last month produced $13,000.

Bryan & Dittmar have begun development work on a property near Redding.

Sierra.

The Plumas *Independent* says it is locally reported that the Garnett Con. properties near Gibsonville will resume operations, the result of a compromise between the company and its creditors.

The *Enterprise* says that the Clay Bank tunnel, near La Porte, is to be started again and pushed ahead as fast as possible. Three shifts will be employed.

Siskiyou.

Musgrave & White at Humbug are running a tunnel on the Lost Lenore and are in 60 feet and have a 20-inch vein of rich ore.——Culver & Plummer have found some stringers on their property which prospect well.——W. Clarke of the Uncle Sam mine has closed down the property.——Caskey Bros. on French creek are still ground sluicing and have been working all winter. They have sufficient water now to work indefinitely.——The American Bar claim on Klamath river is yielding good returns, and work is prosecuted day and night with a force of thirty-eight men.——B. Daggett has returned to Black Bear, where it is stated he will make some extensive improvements. The company intend running a lower level and putting in new machinery to enable them to develop the property.——The property owned by Ball, Traverse & Johnson on Six Mile creek, which was recently opened, promises well. The new shooter put in this summer is working to perfection.——At the Brown & Reeder mine in Fools Paradise district a tunnel has been driven, and at a distance of 18 feet from the mouth of the tunnel they began stoping the ore. During this process a pocket was struck in the stope which yielded $450 the first day. The gold was pounded in a hand mortar. One feature of the find is that the mint returns show that the value of the gold is $18 per ounce, while the average value of quartz gold from this locality is between $15 and $18.

Journal: Andrews & Gallagher had a crushing from their ledge which paid about $200 for a few tons; they have just taken out another lot.——F. Le May has an 18-inch ledge from which he is taking out good pay. He took out a small lot that netted him $200 at the mint. He struck a small pocket, one panful of the decomposed quartz yielding $18 in washing.——Mr. Shearer purchased the old Cartwright & Phillips quartz mine on Humbug and is having a test made of the sulphurets.——In the Pacific mine Supt. A. Smith has completed dams for the keeping out of water. The river bed is of sand formation.——W. F. Shurtliff, who is working a quartz ledge on north fork of Humbug, above the old Eliza ledge, has been doing well lately. His ledge varies from 18 inches to 2 feet in width, and he has a 2-stamp prospecting mill. At present the quartz averages $25 per ton.——The river mines in the Honolulu district of Klamath river have completed their wing and head dams, and are rapidly sinking cuts to bedrock, some being down 20 feet or more. In a short time they will all be hoisting pay gravel from bedrock, which ranges from 35 to 50 feet deep. The early start this season by reason of low water in the river will give the miners a long season to open up a large extent of the river beds and its banks.——The hydraulic miners on the lower Klamath will not have a good season this year, owing to the scarcity of water in the creeks emptying into the Klamath, but they will put in the idle time in fixing up in good shape for next season.——The Morrison & Coburn quartz ledge at Quartz valley has been paying well for some time, yielding about $2000 a month. A force of fourteen hands is employed getting out and crushing quartz.

Journal: The Cherry Hill mine on Cherry creek prospects well. The ledge averages 3 to 4 feet wide, and all the ore bins full, without any chance to crush for lack of water.——The American Bar claim on Klamath river is being worked day and night with a large force.——J. O. Jillson & Co. are adding five stamps to their mill at the Norfolk and Lodi ledges near Henley.——The Golden Jubilee quartz mine at North Fork of Humbug is being worked day and night with eighteen men. The ledge varies from 1 to 4 feet in width.——F. LeMay found another pocket in his quartz ledge on North Fork of Greenhorn, from which he realized $300.——Brown & Reeder made a cleanup of their 2-stamp mill on Shasta river, in Fool's Paradise, and realized $2150 for a week's run. The ledge averages from 14 to 18 inches in thickness.

H. J. Barton is reported to have struck good pay in his wing dam at Oak Bar.——The Distlehorst & Barton dredger is working steadily near the Collins place on Klamath river with good success.

Trinity.

The Highland mine at Taylor's Flat has shut down for the season, owing to the scarcity of water.

Tulare.

The placer miners near White river claim to be cleaning up from $4 to $5 a day.

Tuolumne.

Good ore has been found in the Republican mine.——The Nourse property has been bonded and work will begin on it shortly.——The Rawhide has increased its working force in the mine.——In the Mount Jefferson mine sinking and drifting goes on day and night.——Day and night shifts are working in the Big Oak Flat Nos. 1 and 2.

Democrat: At the Grizzly the underground workings are being rapidly opened up, while thousands of dollars are being expended in new improvements. All work on the property is being done under the personal direction of Supt. Sharwood. The new shaft is down 320 feet, at which point sinking was temporarily suspended. The present principal point of operation is at the 280-foot level, drifting on the vein, beside upraising to the next level. The ledge averages from 6 to 8 feet of quartz, all of which is good and much of it high grade. It carries a heavy percentage of rich sulphurets. Work on the new 20-stamp mill is under way, and its stamps will be dropping within thirty days. It will be run by water power. This same water, after doing duty at the mill, is carried several hundred feet in pipes, and also operates the hoist, good for sinking 1000 feet. The pulp from the mill will be transmitted in sluices across the river, a distance of 700 feet, to a concentrating plant, where eight concentrators are now being put in. The Grizzly has produced $1,000,000 worth of bullion, at one period yielding $7000 per week right along, and that with all the hoisting done by hand and no concentrates being saved.——At the Providence the main shaft is down 290 feet, showing in the bottom 6 feet of rich rock. At 300 feet the second level will be run. Drifting at the 150 level is in progress north and south on the vein. In the shaft the last 50 feet of sinking marked an increase of more than 1 foot in the size of the vein of high grade ore. The old tunnel workings have been abandoned, but will eventually be tapped from the shaft's levels. Already 1500 tons of ore from the shaft are on the dump. A large force is at work grading out a foundation for the new mill, and the plant will be completed and running within sixty days. About seventy men are employed under the superintendency of W. Berry.——At the Gerrymander the main double compartment shaft has been driven past the 100-foot mark, at which point they are crosscutting. Sinking will be continued until the shaft is 500 feet deep, and levels will be run at every 100. When the vein is crosscut at the first level the ore from the quartz body will be sufficient to keep the mill steadily running. J. Joseph is Supt.——Work on the Barry mine, which is on the same lead as the Providence, was commenced last week. The main tunnel is in 150 feet and shows 3 feet of good ore.——At the Seminole nothing is being done but keeping the mine clear of water. Just when active operations will be resumed is as yet uncertain.

NEVADA.

H. W. Ely of Dayton took a bar of bullion to Virginia last week, probably the finest gold ever seen in that camp. The bar was from four tons of ore from the May Day mine in Como, which was worked at the Wilson & Bliar arrastra at Dayton, and was valued at $280. The ore yielded at this rate $70 per ton, and the gold was valued at $19.03 per ounce.

High-grade ore has been discovered in the Heleza mine, near Genoa.——J. Wall is developing a claim that carries good ore values.——H. W. Ely obtained from four tons of ore from the Mayday mine, in Como, $280.——On the dump of the Homestake mine at Hamilton there are 600 tons of smelting ore carrying 65 per cent lead.——Developments in the Star mine at Cherry Creek are showing up good bodies of ore. In the near future a mill with 150 tons a day capacity will be erected on this property.——On the property of the Boston & Nevada M. Co., at Yerington, work has been resumed, the intention being to prospect lower levels before undertaking to operate the matting plant again.

Times: The Douglass mill at Dayton, which started up last week, shut down after an unsuccessful run on the Douglass tailings. We are unable to give any figures of the test run, but the process does not handle the material at a profit.——C. Boyle will begin development work soon on the North Rapidan mine at Como.——The Overland mine, in Silver City, made a strike of fair-grade ore.

OREGON.

Walker & Piper have resumed work on their hydraulic property near Grants Pass.——J. Cox continues work on the Lucky Bart mine.——The Boynton & Fuller mine began crushing ore.——The Dana & Bingham mine struck a good quality of ore.——The mill on the Virtue mine at Baker City has started crushing 100 tons of ore from the Collateral mine.

WASHINGTON.

Near Springdale the Copper Giant Co. No. 1 is sinking on good ore.——Assay returns from Oro Fino ore yielded 31 per cent copper and some gold and silver.——Cottrel & Chappel are developing a copper prospect.——The Cleveland is making carload shipments of ore.——In the Delaware mine, near Republic, the ore assays $4.65 gold, 3 per cent copper and 26 per cent iron. The property is being extensively developed.

The Cascade M. Co. of Milwaukee is locally reported to have bought for $250,000 twenty-

four placer claims in Swauk district, Kittitas Co. The claims are now worked with hydraulic machinery, using the water of Swauk and Williams creeks. Their former owners have been taking from $5000 to $20,000 a season out of the best of them, working in the most primitive way. The gold is found chiefly in bars, which cover the old creek channels along the banks of the Williams, Swauk, Boulder and Baker creeks.

Work will be resumed shortly on the Little Giant mine near Colville. The property has over 500 feet of underground work, and had made one shipment.——In the Rustler mine at Meyers Falls a ledge has been found that is 60 feet wide and well mineralized.

BRITISH COLUMBIA.

The Le Roi M. Co. has been assessed in Spokane for $2,000,148.08. The company has filed a protest against $2,000,000 of the assessment, which represents the company's mining property at Rossland, or the stock representing the same.

A Rossland paper says: "The greed of the owners of the Le Roi mine brought a miners' strike about this week. They sought to make the miners work ten hours a day, instead of eight, for $3.50 per day, and in consequence thirty of the men quit work. As the mine is changing hands, it is likely that the new owners will have to settle the difficulty."

Captain R. A. Parker returned to San Francisco last week from Rossland, B. C. He says the country is unprepossessing, but the values are there. It is a smelting camp. The Rossland ores are sent to the smelter at Trail, a distance of seven miles. The country is a mass of eruptive rocks running in diorite and granite. The ores are in a fissure of aurgite porphyrite that is very hard. The ores are sulphide, carrying gold, silver and copper—enough copper to make a good collecting medium. The ore bodies vary from 1 foot to 16 feet in width and are fairly persistent. The general tenor of the gold value is from $16 to $50 per ton. Capt. Parker says Rossland promises to be a big camp, and permanent, too.

Near Ymir development work on the Bullion group shows seven leads within 500 feet. One ledge is 2½ feet wide and the ore is good grade. The ledges on the Woodside have been opened up in ten different places and in each a fine vein of quartz has been discovered. The ore from both the Woodside and Bullion runs well up in gold and copper.——Near Grand Forks work is being pushed on the O. K. and Lucky Boy properties. The ore now on the dump is said to assay from $80 to $100 in gold.——At Rossland the B. A. Corporation is pushing work on several properties. Supt. Macdonald is working four drills on the Columbia and Kootenay night and day. A raise is being run from No. 3 tunnel. It is in a good body of ore at 60 feet, with neither wall in sight, although the raise is 6x7 feet. A force is at work on No. 4 tunnel and making good progress. Power has been introduced into the work on the Great Western. The shaft is down 100 feet. Two drills will be used in sinking. The Josie is employing about twenty men, and pushing work. Two drills are in use on the 300-foot level. Work is continuing in the Poorman, but no notable results are reported. A new lead outcropping is being prospected.

At Rossland the War Eagle Co. will shortly start work on the Crown Point claim.——Work has been resumed on the Big Four.——A strike has been made on Sunset No. 2; nearly 2 feet of high-grade ore were opened. Several tons of this have been broken out, and average assays are about $52, of which over $30 is gold.——The lower tunnel on the Jumbo is in 825 feet.——The Iron Mask has commenced to drift in the ore body recently opened in the winze from the 300-foot level.——The force on the Victory-Triumph has been doubled by D. B. Bogle, the Mgr., and work is being prosecuted in two places. A parallel ledge about 25 feet from the main ledge was discovered last week. It is about 6 feet wide and carries good values in gold. The old ledge carried its principal values in silver and copper. The new find is being thoroughly prospected.

Assays from samples taken from the Beattie claim, near Trout Lake City, gave seventy-six ounces silver, $47 in gold and 84 per cent lead.——Sixteen carloads of high grade ore from the Silver Cup mine were shipped to San Francisco.——Work continues at the Bad Shot mine.——The Keystone and Ethel will shortly be developed and a shipment of ore will be made.——The Waverly mine will resume operations as soon as the wagon road permits. The company will employ about 150 men.——It is stated that the owners of the Monarch mine, at Field, contemplate putting a smelter in the valley below the mine.——The Union Jack, near Cranbrook, has been bonded for $10,000.——F. Heap of Ainsworth made a carload shipment from the Pontiac and Tecumseh claims. The properties are developed by a 250-foot tunnel. The ore will average 125 ounces silver, $12 in gold and about 30 per cent lead.——On the Number One, Ainsworth, thirty-four men are employed, and sixty tons of concentrates a month are being shipped. There are two grades, one running above 160 ounces in silver, the other 375 ounces. The best ore without concentration averages 100 ounces.

A good strike is reported in the Bolander mine in the Slocan.——The Monte Christo and Colonna property at Rossland has begun shipping fifty tons of ore per day.——A one-fourth interest in the Narmo C. group at Ymir was sold to T. Kereeme for $4000 cash. This property has a ledge of gold and copper ore running across the entire claim.——N. Cochrane of Rossland has taken a bond for $30,000 on the Royal Banner and St. Clair claims in Summit camp. Two shifts have been put to work.

ALASKA.

Mining News: The officers of the Jualin M. Co. received a gold brick valued at $5000 on Thursday last. This was the proceeds of fourteen days' run with ten stamps. The company anticipates a most successful season. The ore is plentiful and the thirty men employed find no difficulty in keeping the mill fully supplied.

THE KLONDIKE.

The Rufus E. Wood sailed this week, carrying a party of forty civil engineers and mechanics who are sent out by a London and New York syndicate to survey a railroad from Norton sound to the nearest point on the Yukon, intended to make a saving of 300 miles in the distance to Dawson.

UTAH.

Two cars of concentrates were shipped from the Galena of Bingham.——The Sunbeam made a shipment of ore.——Another shipment of silver and lead ore was made from the West Argent at Stockton. A similar lot a short time ago showed 45 per cent lead and 45 ounces silver.——The Cigale will make a connection at a depth of 600 feet between the Boston and discovery shafts, that are 500 feet apart. The latter shaft is being sunk and at a depth of 600 feet drifting along the strike of the big vein will be commenced. As soon as the merits of the roasters are determined work on the Cigale mill will be resumed and the plant put forward to early completion. It has become generally known through experiments at the Golden Gate that less of the cyanide of potassium is required to successfully leach the ore after it has been roasted, while at the same time a higher percentage of the values is saved.——W. J. Nelson returned from California and is again giving his attention to his mining properties. The Charlie Ross has been idle for several weeks, but the doctor will renew work in a short time and prosecute its development with dispatch.

At Mercur work on the Tioga is being prosecuted in the tunnel. A distance of 200 feet has been reached.——The Columbia Co. has let a contract for sinking the shaft 50 feet, which will give them a total of 200 feet.——N. W. Jones sent to Salt Lake the semi-monthly shipment of cyanides, from the Geyser-Marion, worth about $7,000. —— J. Nichols made his first shipment of silver-lead ore from the Buckhorn. The consignment brought good returns. Work in the Overland mine is progressing rapidly. The main shaft has reached a depth of 200 feet. At the same time the incline being run on the vein from the old workings to connect with the shaft has been driven a distance of 170 feet and all the way a fine body of ore has been gone through.

The White Pine group has a quantity of lead ore on the dump which will assay about 25 per cent lead and from 60 to 140 ounces of silver. An incline has been run 300 feet and in the face the vein is 6 inches in thickness. A shipment will be made soon. —— In the Resolute shaft of the Mercur mine at 500 feet depth an 18-foot vein has been found of fair milling ore.——Drifting is going on in the Mattie ground. Ore in the face of the drift shows values as high as $10.——In the Lulu the air shaft is 500 feet. In upraising a 7-foot body of ore was cut of good values.——W. W. Orr, resident representative of the Gold and Silver Extraction Company started up the new mill at Lion Hill with which the ores of the Chloride Point are to be leached. Concerning the ores of which the mine is productive, Mr. Orr says, after repeated experiments, that they afford as nice a leaching proposition as any he has ever experimented with.——The Ontario at Park City it is said will put through 100 tons of tailings a day by June 1st.——Work has begun on a plant to handle the tailings and a certain variety of ore of the Silver King.

Tribune: The Galena of Fish Springs marketed 115 tons of ore the past six months, from which the company derived $10,783.49, or an average of over $93 per ton. For three months previous to the period covered by the shipments no ore was hoisted. The time was devoted to putting in a new hoist and the exploration of new ground, while for the quarter antedating that no record was made. In the marketing of the ore $14 per ton was paid for transportation. The cost of smelter treatment was light, the last shipment with which the company reported and which yielded as much as $1750 in silver and lead, commanding a premium. It ran high in lead in addition to a fine showing in silver, while the output for six months afforded an average of 50 per cent lead and a little over 100 ounces silver per ton. The report from Supt. Hoffman shows the mine in excellent condition.——The Hatfield at Tintic is shipping high grade ore. ——The Martha Washington made another large ore shipment. —— The Utah at Fish Springs shipped 22,000 pounds of fair grade rock.

Tribune: Although he has refrained from making announcement of the fact, Mgr. Cohen of De Lamar's Mercur mines acknowledged that he had already made three cleanups of auro-cyanide at the Golden Gate mill and that he would repeat them at intervals of every four or five days. The tanks, which represent a total capacity of 2700 tons, have ceased leaking and the output will reach a total of 500 tons a day. At present Mr. Cohen is conducting some experiments on a large scale in the lixiviation of the ores, and the result will determine whether or not he will roast all of the ores, whether they are of the sulphides or oxidized. To that end he has one tank filled entirely with ores that have passed through the roaster and another filled only with raw ore. The leaching that affords the best result will in the future be used. Meanwhile the results thus far obtained are said to be quite satisfactory.

The Central Eureka at Eureka is shipping twenty-five cars of high grade ore per month. ——The Treasure Hill has reached a depth of 385 feet. The weekly shipments will reach 125 tons.——The shipments from the Tintic district for last week were twelve cars of concentrates, seventy-six cars of ore and twenty-five bars of bullion.——Ten cars of ore has been shipped from the Iron mine and two from the Treasure Hill at Silver City.

IDAHO.

Work on the double-compartment shaft at the Twin Sisters mine, near Centerville, is progressing.——Development work on the New York and Jupiter mines continues.—— The Twin Springs Placer Co. has begun piping.——The tunnel on the Accident mine is approaching the 100-foot mark.——Bowen & Jordan contemplate erecting a large mill at the Revenue mines on Elk creek.——C. E. Taylor sold a half interest in the Golden King mine near Dixie. A strike has recently been made in the mine of great value. A mill has been erected and is about ready to run. The cyanide process has been introduced after thorough tests made at the experimental works in Denver.——A big body of ore is reported cut in the Tyrannis group of mines in Little Smoky. This ground was supposed to have been worked out.——J. J. McDonald started work on an extensive enterprise near Lardo, near the Payette lakes, on a contract from Dr. Law of California to build a canal for placer mining, to be seven miles in length and 10 feet wide on the bottom. The contractors expect to complete the work in three months. Dr. Law has secured a large tract of placer land near Lardo and expects to work it. He is an old miner, having been connected with placer mining in California since the early days. His home is in San Francisco.

Times: A vein of ore carrying over 1200 ounces of silver and 14 per cent of copper per ton was cut in the Pass group of mines, near Hailey, a few days ago. The seam is being explored in order to ascertain its extent. This is said to be the first copper ore found in that vicinity.——The Golden Star M. Co. is putting the Camas No. 2 mill in working order, and will begin a trial run on its ore at the earliest opportunity. The cyanide works at the Camas No. 2 group of mines are ready for the summer work, and Mgr. Frank began filling the tanks, which will be in operation until frost compels a shut-down for next winter.——At the Golden Star group, on the Gold Belt, they began sinking to the 300 level.——S. T. Pearson has begun work at the property of the Bingham Placer M. Co. at Gibbonsville. He reports the adjustment of the hydraulic elevator about completed, and expects to be able to begin the washing of gravel again shortly.

The mill on the property of the Lucky Boy M. Co. at Custer City has started again and is running on good ore. Fifty-five persons are employed on the mine and mill, while directly and indirectly employment is afforded about 100.——E. Burson found a ledge near Idaho City that is 10 feet wide and yields good returns.——It is locally reported at Delta that M. Craven contemplates building a 5-stamp mill this summer to work the ore from the Pony mine.——In the Chloride Queen mine, near Wallace, they are working in 2 feet of good ore. The values are gray copper and some gold.——The Father Lode mine has found a new and valuable ore body.——The Sonora M. & M. Co. at Burke has let a contract to extend their tunnel 500 feet.——Mgr. Wiley is operating extensively in placer mining near Grand View.

MONTANA.

The placer mines at French gulch are in operation, and will be worked as long as water lasts. W. R. Allen has several men at work. The Tacoma Placer Co. also has a force at work and I. W. Farrell a small force.——Another gold brick from Yahk ore was sent out, the product of the Goldflint Co.——Bartlett Bros. & Co. have ten tons of ore on the dump on the Merry Holiday mine at Revenue.—— The Monitor Co. at Revenue shipped 180 tons last month. The Monitor Co. has also 1000 tons of second-class ore on its dump.——Two weeks ago the ore shoot on the Lyons lease on the Arkansas, at Revenue, was lost. Last week the ore was rediscovered. The value is not high, but the vein is wide. The assays indicate from $30 to $50 a ton.——Dallen & Walin of the Heart Solo mine have four tons of good ore for shipment on the dump.——The Washoe Co. has secured under bond and lease and partly outright purchase, it is stated, the Hesperus, the Lizzie, Yellow Jack and the Colorado Fraction lode claims, all close to the Hesperus lode claim. The entire consideration is said to be about three-quarters of a million dollars. Extensive developments will take place. The Hesperus is one of the best known claims which passes to the Washoe Co., and though there has been some money spent in development work and no pay ore bodies so far discovered, many mining men say that with depth there is likely to be found large veins of good copper ore. There is a well-defined lead on the south side of the Hesperus and one also known on the north vein on which a shaft has been sunk and considerable development work done. For over fourteen years the Hesperus lode claim was in the courts and title in it was finally awarded to J. A. Murray and his associates, Mr. Murray owning a large interest in the property. The Lizzie lode was owned mainly by Hickey brothers. The title, like that of nearly all the claims in that vicinity, was for a long time in contest, but has been settled. The Yellow Jack was in dispute for years and finally the surface was deeded to certain claimants and the mineral rights to P. Mullin, who has now transferred it to the Washoe Co. It is stated that the Washoe Co. will sink 1000 feet on the Hesperus and a shaft the same size will go down on the Yellow Jack in the near future. Some extensive crosscutting and exploration work will be done on all the claims before next fall.

Ore hauling continues from the Duck Creek properties, near Townsend.——C. P. Abbott has begun operations on the Cecil W.——J. T. Ingram is placing hydraulics on his diggings on Deep creek, and expects a busy season.——Glora & Mills have shipped some ore from the Ohio mine, in Jefferson county, that runs nearly six ounces in gold.——Ore is being taken from the Elgin mine at Rochester.—— M. Bullet reports a good strike in the Locket at Rochester.——J. Miller has a 2½-foot vein of good ore in the Watseca.——G. Cudmore made a shipment of ore from his lease at Neihart.——The *Miner* says that a strike was made in the Keystone, near Sylvanite. The ledge was reached at about 492 feet and the tunnel is in over 500 feet and still in ore. The crosscut will be continued and the full width of the ore body learned before drifting. Until this work is accomplished it is not probable anything definite will be known as to the size of the new mill to be erected; but from present indications, a plant of considerable magnitude will be erected. In the upper level the vein is known to be 60 feet wide and one wall yet to be found.

The Silversmith mine near Basin is added to the list of shippers.——The Rose mine is milling ore at the Boulder mill.——The Hope shaft is down to the 400 level, and work around the mine is rushing.

The Eva May has resumed ore shipping.—— Near Hassel, Patch & Wilson continue development work. They have several shafts and tunnels, and have taken out some lead ore.

At the Boston and Montana, sinking continues at the West Colusa. At the 300, two crosscuts south are in good second-class ore. In all probability the ledge will be 150 feet wide from foot to hanging, as already each crosscut is over 100 feet. Crosscutting and drifting are being pushed at 400. At the 500 repairing is being done. At the 800 crosscutting continues toward the hanging.——Since the organization of the Monitor Co., it has been decided to sink a 500-foot shaft on the property. The Monitor is in Park Canyon, and although there are many promising properties there, copper ore rich enough to make a paying proposition has never been found.—— The Butte *Miner* says it is stated concerning the Boston and Montana and Montana Ore Purchasing Co. affairs, that there has been a good deal of talk in New York and Boston about a settlement of the differences of the two corporations by a large cash offer for all the Heinze holdings in Butte. It is stated on good authority that several propositions have been made to Mr. Heinze by the representatives of the Boston and Montana and Butte and Boston Co's., but up to this time no offer to purchase has been considered. —— The Basin *Progress* says that at the Ruby mine the mill has been increased to a capacity of sixty tons per day, and yet it is not large enough to handle the ore that can be produced from the mine, and at this time the ore bins and chutes are all full of ore until they don't know what to do with it. With the mine in this condition it is but natural to suppose that the company will shortly make further additions to the mill, giving it a sufficient capacity to handle the output of the mine. A strike was made a few days ago of a chute of rich ore 15 feet wide.——At the Bon Accord placers near Dillon the huge dredge boat of the Bon Accord Co is being rushed as rapidly as mechanics can put the machinery together, and it is expected that by the first of June the machine will be in operation. It is claimed that the Bon Accord will be the largest gold dredging plant in America and is a departure from the plans used in the construction of the dredge boats near Bannack.

H. J. Reiling and F. Pete are at Bannack from Salmon City, where the former bought the placer ground of McNutt on Moose creek, twenty-five miles from Salmon City. He is going to build a boat there this summer. The amount of ground bought is 300 acres and the amount paid $175,000. He went to Bannack to look over some of the Cooper ground, which has been sold to a Chicago company. They expect to build a dredge boat there this summer.——Machinery for a fifty-ton concentrator has been purchased by the owners of the Daisy mine at Cooke, says the Red Lodge *Picket*, and will be freighted in from Cinnabar early in June. The upraise in the mine connecting the two tunnels has been completed and the miners temporarily laid off. Enough ore has been blocked out in the mine to keep the concentrator running four years. As soon as the concentrator is erected, a force of sixty men will be kept at work by the Daisy Co.

SOUTH DAKOTA.

The Wasp No. 2, near Deadwood, is blocking out good ore and shipments will be steady through the year.——The Little Blue Fraction is developing into a good property.

The Golden Crest group, near Deadwood, made a strike of ore carrying gold and silver, with sufficient galena for smelting.——Work on the Gilt Edge continues successfully. They are taking out fifteen tons of ore daily that runs $40 per ton.

WYOMING.

G. Layton, Supt. of the Carissa mine at South Pass, has discovered some ores—a hard, flint-like quartz of bluish cast, impregnated with free gold—which presents a striking resemblance to the gangue that prevails on the mother lode in California. The shaft on the Carissa has attained a depth of 185 feet. The vein at that depth is 6 feet and shows an average of over $20 in gold.

J. B. Conn has fourteen men on the Clark's Fork placer mines near Landers.——The Empire State mine has resumed operations.—— C. M. Louther & Co. of Boston constitute the Lower Douglas Creek Placer M. Co., near Laramie, and will probably put in mining machinery, including a dredger and a hydraulic elevator. The tract comprises 800 acres, of which 400 acres will probably run from 15 to 60 cents per cubic yard, with a depth of 10 feet to bedrock.

H. J. Van Dusen has filed a bond for $10,000 for the purchase of J. Edmunson's copper and cobalt mine near Tie Siding, in six months. The purchase price is $35,000.

COLORADO.

The Ironclad mine, Cripple Creek, has been secured under a five years' lease by H. A. Von Hemert, who started work on the property. The mine has been closed down for six months because the owners failed to make the property pay expenses. The shaft is down

over 400 feet, and the ore chute has been worked out above the 300 level. It is the intention of the new lessees to continue the shaft to a depth of 1000 feet and run drifts and crosscuts at every 100 feet below the 400 point. The mine has been among the list of shippers for four years and some rich ore has been taken out. One carload that was mined at the 200-foot level averaged a little better than $300 per ton, divided almost equally in value between gold and silver.—The Engineer, owned by the Currency Co., is being worked under lease. They have made several small shipments that paid expenses. At a depth of 60 feet the pay streak is 6 inches and assays without sorting from $35 to $50 per ton.—The shaft on the Londonderry is down 300 feet and it is understood that there is a streak of pay ore at this point.—Johnstone & Co., leasing on the Gold Sovereign, on the west slope of Bull hill, have started sinking for a new level. The lease is making regular shipments.——G. D. Johnstone has secured a lease on a portion of the Ingham on Raven hill and is to sink a shaft 200 feet. The block of ground he has secured is known to contain a rich ore chute.—The Midland Terminal has completed its spur and ore scales to the Elkton mine, and the output will be increased from 60 to 90 tons per day. Assays are obtained on picked samples of the ore encountered in sinking the shaft that run better than 100 ounces. Samples on 12 inches of the ore have been obtained that show a value of $1000 per ton.—The Lindsay lease on the Arequa townsite made a shipment of three carloads that it is believed will run from four to five ounces per ton. This came from the 165-foot level and shows sylvanite in quantities. The chute has been drifted on about 20 feet, and if it holds out 30 feet more in the drift there is no doubt but that the Chicago people who are working it under a $125,000 bond will become the owners of the block of ground the second day of July.——The Pence-Miller G. P. M. Co. at Breckenridge has seventy men at work on the new ditch for the operation of the first plant of hydraulic placer mining machinery which will be put in at the mouth of French gulch. The ditch is to be several miles long, 11 feet wide on top and 6 feet wide on the bottom, and is intended to carry a body of water 2½ feet deep. This season plants will be established at the mouth of French gulch, near Breckenridge, and on the Golden Crown placer. At the latter place a bedrock shaft was sunk several years ago by C. L. Westerman and the gravel was found to be rich in coarse gold. The great inflow of water at the time prevented profitable operation through the drifts along the bedrock. When the plants are in full operation it is expected that they will handle 12,000 yards of gravel for twenty-four hours.——T. McDonald is unwatering the old World's Fair shaft near Cripple Creek under bond and lease.——The report that the Ingham Co had ceased working was incorrect.——The Dead Pine is again making regular shipments, the new level having reopened the chute after several weeks of prospecting.——The Village Belle at Eldora sustains its reputation as a producer of high-grade ore from its tellurium pay streak, and arrangements are making for putting in new machinery and sinking a new shaft.——The Revenge group are taking out high-grade ore.——The Ready Cash are pushing their tunnels through a 10-foot ledge of ore.——The Ironside has a force at work on ore running $35. The Cora O. was recently sold for $10,000.

The new 150-ton mill of the Mollie Gibson and Argentum-J. at Aspen is completed and running successfully. The Mollie ore demands one-third of the capacity, six tables, and the Artentum-J. two-thirds, or twelve tables. Neither company, says the *Record*, is outputting any ore, the forces being practically laid off, but the mill is kept busy upon the mass of low-grades that have been piled on the dumps for the past ten years, and which can now for the first time be profitably handled. The ratio of concentration is ten tons into one, running high in lead. The A.-J. alone has 14,000 tons on the dump. The Mollie has been leased in blocks and is being developed by lessees.——The new concentrator built by the Smuggler people is not entirely completed. It is larger than the old one and contains valuable improvements. The Smuggler is working from 150 to 200 men, and in addition to the large amount of ore on hand is producing enough ore to keep the mill busy.——The Della S., Regent and Bushwhacker are worked by lessees with the usual result. Some are doing well.——The Durant, Compromise and Millinee are working some men on company account and are also leasing ground in good paying ore.——At the camp of Independence the Hunter Pass mines are making an output to keep the new mill busy now in course of erection, to be completed by September 1st. A force of 120 men is employed.

With the completion of the switches from the Midland Terminal to the Elkton at Cripple Creek the output of the latter is expected to be increased from sixty to ninety tons a day. Late assays from picked samples run over 100 ounces in gold to the ton.—Three-twentieths of the Bonnie Nelson have been sold for $7000.——Twenty men are at work in the Uintah tunnel and the work of crosscutting in the Big Banta for the Uintah ore shoot is being crowded day and night.——Dean & Cain have opened on the Deadwood the same blanket vein from which the lessees on the Pauper and other portions of the Deadwood have been making steady shipments for the past eight months. At the point entered the blanket holds an average of 2 feet of ore that ships at $30 for second and $80 for first grade.——Sixteen and a half tons of ore shipped from the Wirth mine at Ward ran 5.21 ounces in gold and 1.28 ounces in silver. There will be another carload of smelting ore shipped this week.——The Sedalia at Leadville is producing fifty tons per day of mineral with twenty-eight men This includes the whole payroll.——The Smuggler-Union stamp mill at Pandora is treating 200 tons of ore per day on an average. From six to eight tons of the mineral are concentrated into one and from two to three carloads of concentrates, worth from $60 to $80 per ton, are the daily product.——A shipment of ten tons of ore from the Mediterranean group at Rico to the concentrator has been completed. The ore body averages from 2 to 7 feet in thickness. Every ore bin of the concentrator is filled with ore. The capacity of the mill will be fifty tons per day.

The Tom Boy is again working on the true lead. The value of the ore now being milled is not made public, but it is said that some of it assayed $500. Development is being pushed to open up enough ground to keep the mills, with their 200 tons a day daily capacity, steadily employed.——The mills at Empire are running night and day.——A promising strike of sulphide ore has been made near Dillon.——The Cripple Creek output has been reduced somewhat by the bad condition of the roads.—It is estimated that the Leadville gold properties are outputting 750 tons a day.——The Concrete mine of Gilpin county employs sixty men, who are taking out over one ton a day per man of free milling ore.——Mgr. Newell of the Ute & Ulay reports Lake City showing greater activity than ever before at this season of the year. He says the Golden Fleece is working full force, and 100 men are working on the Ute & Ulay.—The Taylor park placer near Tin Cup is working sixty men. The flume is 2500 feet long and preparations are being made for extensive work.——J. H. Sinclair is shipping ore from the Forest Hill, the richness of which may be understood when it is considered that it is hauled from Forest Hill to St. Elmo station at a cost of $20 per ton.——A new placer company, represented by Garden Bros. of Illinois, has let a contract for a four-mile ditch from Willow creek, to be 6 feet wide and 3 feet deep, to be completed within six weeks. The company proposes to push placer work.

Ward *Miner*: The Columbia, Nelson and Plow Boy mines, near Ward, have been sold, the total aggregating $105,000. Machinery for development is steadily coming in, and nine of the leading mines—the Utica, Star, Wirth, B. & M., Newmarket, Adit-Dew Drop, Giles, Sullivan, U. P., Ward-Rose and Boulder County—are in good ore and heavy shipments await the coming of the railroad, but a few days distant. The Columbia mine passed into the hands of one of the largest mining companies in the State. Fifty thousand dollars is the figure reported. It is historically the second greatest mine in the district, second only in interest to the Ni Wot, being the original discovery of the camp, made by Cy Deardorff thirty-eight years ago. From a shallow development it has produced more than $350,000 in gold. Following the Columbia sale comes the Nelson. The price paid for the property is $32,500. With such development as is proposed for it by the new owners it will soon be numbered among the big propositions of the district. The shaft is 370 feet deep, and there are only about 800 feet of levels, yet the known production of the Nelson exceeds $40,000. The smelting ore runs from $60 to $85 per ton in gold in carload lots. The sale of the Plow Boy group by M. Finnerty was made to the same company that purchased the Nelson mine. The amount to be paid for the group is $25,000, with a small cash payment down and the balance in installments.

The Colorado smelters obtain the larger part of their needed lead ore from the Coeur d'Alene mines of Idaho. On this account, says the *Mining Industry Review*, the question of freight rates from Idaho to different smelting points has a very close relation to the debit and credit sides of profit and loss account. In the past the rates have been fixed to the apparent satisfaction of the smelters, but last week a change went into effect which appears to be strongly in favor of Leadville as a smelting point and against Denver and Pueblo. This change gives Leadville a rate from Idaho of $2 per ton less than the rate to Denver. As Leadville gets its iron from home, while Denver pays $2 50 per ton freight on it, it is apparent that the advantage is largely in Leadville's favor.

MINNESOTA.

The Stella mine, near Rainy Lake, has a 5-foot vein of fair grade gold ore.

ONTARIO.

The April cleanup of the Mikado mine near Rat Portage was $8000.

NEW MEXICO.

The Silver City *Enterprise* says that the Copper Queen mine and mill at Cooney were closed down on the 12th. The property has not paid. C T. Mixer, from Ishpeming, Mich., is examining the property and upon his report will depend largely whether the mine and mill will be operated in the near future or work indefinitely suspended.—At Mogollon R. Thomas has men at work upon the Deadwood mine and will soon be ready to run the Deep Down mill again. The last mill-run from this property paid good profits.——The Confidence keeps about seventy miners employed taking out ore which supplies the 30-stamp mill at Whitewater. The new pipe line to supply water power for the mill and run the motors is nearly completed.—The work of retimbering the shaft and drifts upon the Little Fanny mine has been completed and operations upon the property suspended indefinitely. The work was to secure the mine against a cave-in resulting from the idleness of the mine for the last two years. Its long-continued suspension of operations is a puzzle to every one but the insiders.——On the 11th the Hanover mine suspended operations, throwing fifty men out of employment. This property has produced fifty tons per day of copper ore the past eighteen months. The property is owned by Catron & Simpson. N. S. Berray, representative for Mr. Simpson, has had charge of the property under lease from Catron working the mine for Simpson. The lease from Mr. Catron expires on June 1st, after which time a farther extension of the lease could not be obtained, hence the suspension of operations.

ARIZONA.

Denver men have purchased the tailings of the Mammoth mine, near Tucson, amounting to about 180,000 tons, and will erect machinery for working them. They have a cyanide process. They will employ forty men. The Mammoth will turn out over 100 tons of tailings a day.——The Kingman G. M. Co. has been organized to develop properties near Cedar, which are said to have enough ore in sight to justify the erection of a 10-stamp mill.——C. Toohey of Phœnix has begun hauling 2500 tons of ore to the mill of the Standard group, in Santa Maria section.——In the Santa Maria district, Yavapai county, it is stated that the cyanide plant of the Waters Co. is in operation and a large percentage of gold saved. A contract has been let for the driving of a 400-foot tunnel on this property, and 100 feet has been completed.——It is said in Yuma that in the Castle Dome property, long since abandoned as unprofitable, now being operated by J. D. Thompson, a body of ore of good values has been opened.——The Great Republic mine near Globe, at a depth of 100 feet, has a 30-foot ledge carrying copper and gold.——Development work on the Franco-American M. Co.'s works, near Tucson, continues with satisfactory results.——At Chittenden the Hardshell mine continues producing good ore.——The Three R mine has been bonded and development work will be continued.——The Bisbee *Orb* says that the development work on the three tunnels on the 600-foot level of the Copper King is progressing rapidly and everything looks favorable. The ore body is said to be large. There is available cash in the treasury to push development work for several years, besides erecting the proposed 100-ton smelter when needed.——The Mojave county *Miner* says Santa Fe Pacific railroad officials are considering a proposition for a $5-rate on low grade ores. The rate will go into effect before June 1st, and ought to be the means of moving thousands of tons of low grade ores smelterward.

W. P. Hamlyn has purchased a group of twelve mining claims near Prescott for $22,500.——Development on the Gold Standard at Santa Maria is progressing.——On the Purple Rose an ore body 14 feet wide has been found.——The Turnbaugh and Pocahontas are both pushing work.——At the Red Rock mine the vein is 18 inches wide, assaying $60 per ton gold. The property is being operated by M. Foe of San Francisco.

The Elkhart shaft, near Chloride, has been sunk 315 feet and a heavily timbered station is being put in at the 300-foot level. Sinking will continue to the 400-foot level. About 40,000 tons of ore are blocked out, and the large concentrating mill is running part time, producing very good grades of shipping concentrates, and a large quantity of pyritous headings, which are being held on the ground, awaiting the erection of a matting plant.——The Tennessee, on the same vein as the Elkhart, and the Schuylkill lying between them, have opened good bodies of similar ore. This vein is large and frequently shows chimneys of galena as much as 15 feet in width. The work done on the three properties aggregates nearly 4500 feet, of which 2670 feet is on the Elkhart property. The Schuylkill shaft is down 220 feet, and the shaft on the Tennessee is sunk 195 feet.——The Minnesota mine, owned by J. Burry and the Baldwin estate, yields high-grade ore.——An Eastern company is working the Merrimac, from which high-grade ore has come.——The Altata has been revived. This property carries copper ore.——The ore of the Klondike mine, in Mojave county, is in the nature of spar, but the gold being free admits of amalgamation on plates instead of making it necessary to submit to the more expensive panning method in vogue in other parts of the county.——The mines of Cedar district, in Mojave county, chief among which is the Belle McElroy, are showing up satisfactorily. The mine named has a 5-stamp mill on it, the gold being susceptible to treatment by amalgamation and concentration. The 180-foot shaft is in ore all the way, which exists in larger quantity and of better quality in the bottom than elsewhere.

LOWER CALIFORNIA.

Californian: The development of the sulphur mines on the desert near Ensenada is progressing. Considerable quantities of the ore have been shipped to their refining plant at Ventura, and it is now proposed to establish a refinery at the mines. The surveys on the proposed railroads have been completed to Yuma in one direction, and the engineers are now at work on the coast route. There is practically an unlimited amount of the ore, which is found in deposits, or rather vertical shoots, and at present they are blasting in the surface workings. With depth, however, their method of excavating must be changed, owing to the sulphurous fumes which fill the shaft.

MEXICO.

A St. Louis company is working on the Rio Aros, near Sahuaripa, and has a 5-foot ledge running an ounce in gold and forty-seven to fifty ounces in silver. It has a shaft 75 feet. Reduction machinery will be erected. J. M. Beauchamp is Gen. Mgr.——The Alamos mine has sent to the Culiacan mint sixty-nine bars of silver valued at $64,226 64 silver and $476.87 gold.

Near La Colorado, P. Negro is working La Patria mine, as much as the dearth of water will permit. With a small mill, which he runs forty-eight hours twice a month, he gets $4000 in gold.——Near Minas Prietas development on the property of the Yakui Co. is progressing. A ledge of $35 gold ore has been discovered.——On the Guillermina mine, at a depth of 30 feet, a large ledge of $10 ore has been found.

NEW ZEALAND.

Minister of Mines A. J. Cadman officially announces from Wellington that "a bonus of fourpence per pound will be paid on the production of the first 100,000 pounds weight of good, marketable, retorted quicksilver, free from all impurities, from any mine in New Zealand, on conditions that at least one-third of the quantity is produced on or before the 31st March, 1900, and the remaining two-thirds on or before the 31st March, 1901. No bonus will be payable until the whole of the 100,000 pounds of quicksilver has been produced as stipulated to the satisfaction of an officer to be appointed by the Minister of Mines, and on whose certificate alone the bonus will be paid."

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FOR KOTZEBUE SOUND—From San Francisco by Steamer: May 28.
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Coast Industrial Notes.

—May rains have greatly aided California miners and farmers and a fair year's yield is now looked for.

—The Union Sugar Co. of San Francisco is building a $500,000 factory at Santa Maria, Cal., where articles of incorporation have been filed.

—The well of the Central Oil Co., Whittier, Cal., has commenced to flow at the depth of 1065 feet. The company has a new steel tank of 20,000 barrels capacity at Los Nietos.

—Work on the extension of the Palouse branch of the Northern Pacific Railroad is being pushed ahead, 150 men being employed on the grading work. Trains will be running into Lewiston, Idaho, by July 1st.

—The Hemman Construction Co. of St. Louis, Mo., has the contract to put in an $8,000,000 sewerage system in the City of Mexico. The services of 1000 laborers for four years will be required.

—Washington, D. C., authorities decide that California marble can be the material used in the new San Francisco postoffice. Bids for iron work thereon, aggregating $700,000, will be opened June 23rd.

—The Stockton and Tuolumne County Railroad will be sixty miles long from Stockton, Cal., through Copperopolis, Angels Camp and Sonora to Summerville. Surveys have reached Copperopolis. There are rails and ties for twelve miles of track on the ground.

—Coast trade with Siberia is growing. Last year three vessels were sufficient to carry all the freight offering. During the last two months the barkentines Addenda and J. M. Griffeths, the barks Edward, May and Wilna and the steamers Taifu and Ailsa Craig have all left San Francisco for the Amoor river. Their cargoes mainly consisted of flour, salt, lumber and general merchandise.

—In the Sierra Nevada foothills in Placer and Nevada counties, Cal., the Towle Bros. Co. has large portable engines dragging logs up and down hill and loading them onto trucks, which are drawn by steam wagons down to the railroad. The company has built good roads, of easy grade, around the various points along the ridge, and the steam wagons only come into the county road in two or three places. When they do they blow their whistles to warn travelers.

—A new capitol building for the Mexican Government, costing $5,000,000 in Mexican money, is to be erected in the City of Mexico. The building will be 330 feet square and surmounted by a large dome of imposing design, supported by thirty-two columns. Competition for the award of the design was opened about a year ago and closed last November, fifty-two competitors from all parts of Europe and United States taking part. The first prize of $15,000 has been awarded to A. Boari, a Chicago architect.

—Contracts for the complete construction of the railway to be operated from Skaguay to Lake Bennett and eventually to the Yukon river were awarded in Seattle this week. The managing head of the construction of the railroad is E. C. Hawkins, of Denver, Col. Under the plans adopted the road is to be built over the White Pass to a point on Lake Bennett, forty miles, from there it is the intention to push the work of construction to Fort Selkirk, nearly 400 miles from Skaguay. The men interested in the White Pass Railway Co. claim that they have matters arranged in such a way with the Governments of the United States and Canada, that the most feasible route can be adopted.

—The directors of the Mexican Land, Navigation and Railway Co. have decided to begin work at once on the construction of the railway from Paso del Rio de San Juan, in the State of Vera Cruz, to a point on the Tehuantepec railroad, and to place orders in the United States and Great Britain for the necessary material. There is one peculiarity of the trade conditions of Mexico which teaches an important lesson. In all the northern and border States it may be said that the United States practically monopolizes the trade; further south England and Germany claim fully one-half, while in the southern part of the country England and Germany divide between 80 and 90 per cent of the whole trade.

—Frank L. Brown, of the Washburn-Moen Co., a director of the Manufacturers and Producers' Association, has a telegram from the Transcontinental Freight Conference at Milwaukee that advances have been made on west-bound car rates and on differentials, but that rates on east-bound freights have not been advanced, only changed. The new and old rates in five classes in less than carload lots for each 100 pounds are as follows: Class 1, new $4, old $2.40; class 2, new $2.60, old $2.15; class 3, new $2.50, old $2; class 4, new $1.90, old $1.70; class 5, new $1.60, old $1.65. For carload lots—Class 1, new and old $1.60; class 2, new $1.25, old $1.10; classes 3, 4 and 5, new and old unchanged, are respectively $1 and 95 cents.

—Congress will soon be called upon to decide the question of building a canal connecting the Atlantic and Pacific oceans. Chairman Davis of the Senate Foreign Relations Committee says: "The need for a connection between the Atlantic and Pacific cannot be questioned. Our interests demand it. With a canal between the two oceans we would have nothing to fear from an attack on our Pacific coast. With a liberal appropriation, say $100,000,000, a canal could be constructed through Nicaragua that would be of value to the United States Government for all time to come." When the report of the Walker Board upon the feasibility of the Nicaragua canal route comes to Congress, it will be one of the strongest documents in the history of American endeavor to secure the interoceanic waterway. Admiral Walker says that no more striking lesson of the necessity for such means of communication between the oceans could have been given than in the long trip of the Oregon. Admiral Walker will dwell at length upon this phase of the subject, and will point out the advisability of beginning work upon the canal at once.

—Since war was formally declared against Spain the United States Government has bought over 12,000 tons of British Columbia coal. The Government has had no trouble in getting this coal, although it is a contraband of war, and England as a neutral nation could not allow it to be taken from her mines. By purchasing the coal from a third party this stumbling block has been surmounted. The coal purchased by the Government is to be disposed of in several ways. The U. S. monitor Monadnock, at Port Angeles, Wash., will use 1500 tons. Vessels conveying coal to Port Orchard, Wash., are also on an 8000-ton contract. The ship Henry Villard is at Comox, B. C., loading 3000 tons for Honolulu, where it will pass into the hands of the Government. The Villard is doubtless the first of a fleet of sailing vessels that will be sent to Honolulu with coal for the Government. The coal is to be put ashore on the island and kept for the use of war vessels and transports on the run to Manila. It will undoubtedly be British Columbia coal that will be purchased. Unless the Government kept a supply on the islands it would often be impossible to get coal. Until the last liner arrived from Australia there was a great shortage at Honolulu. E. E. Caine of Seattle says he has sold the bark Enoch Talbot to the United States Government, with her cargo of 2300 tons of Comox coal The purchase was made by Commander Green, of the Port Orchard navy yard, for the Government. The Talbot is to be kept at the drydock as a coal ship. It is the intention of the Government to keep 3000 tons of British Columbia coal on hand. The question: "Why does not the Government buy American coal when a quality almost, if not quite, as good can be purchased for less money?" has never been answered. The Blue Canyon Co. of Whatcom, Wash., has coal that stands a navy test as well as Comox, and they have plenty of it for sale.

Personal.

T. P. Slessinger is Mgr. Kohinoor mines, Leadville, Colo.

Wm. Van Slooten, a New York mining engineer, is in San Francisco.

W. G. Martin becomes Gen. Mgr. Etta M. and M. Co., Prescott, Ariz.

W. G. Boyle becomes Supt. Golden Link M. and S. Co. Creede, Colo.

F. Searles, the mining attorney, Nevada City, Cal, is in San Francisco.

E. K. Naneville has succeeded J. A. Veatch as Supt. Fern mine, Ymir, B. C.

G. Stayton, Supt. Republican mine, Jacksonville, Cal., is in San Francisco.

G. Mainhart, Supt. Omaha Con. M. Co., Grass Valley, Cal., is in San Francisco.

C. L. Lang, Supt. Star mine, Sonora, Cal., has returned home from San Francisco.

F. F. Coffin, Supt. Griffith Con. mine, Diamond Springs, Cal., is in San Francisco.

J. M. Owen succeeds D. F. McCarthy as Supt. Garfield Con., Cripple Creek, Colo.

J. C. Diamond, managing owner Limpensel mine, Placerville, Cal., is in San Francisco.

G. W. Grayson of San Francisco is visiting his Shirttail Mountain mines near Kingman, Ariz.

R. Walker of Grass Valley, Cal., becomes associate Supt. Tom Boy mine, Telluride, Colo.

E. H. Barton, a mine owner from Sonora, Cal., has returned to the mine from San Francisco.

G. E. Hoyt, managing owner Gopher M. Co., Shasta, Cal., has returned home from San Francisco.

A. Moore, Supt. Clay Bank Tunnel mine, La Porte, Cal., has returned home from San Francisco.

J. A. Veatch, Supt. Fern mine, Nelson, B. C., is examining mining properties at Forbestown, Cal.

M. F. Motherwell, Supt. Three Sisters mine, French Gulch, Cal., has returned to the mine from San Francisco.

H. K. Shockley, Supt. Phœnix M. &. I. Co., Nevada City, Cal., is in San Francisco, en route to Cincinnati, Ohio.

Samuel J. Hendy, of the Joshua Hendy Machine Works, left San Francisco last Wednesday on an Eastern business trip.

Covington Johnson of San Francisco is examining Rossland, B. C., mining property with Geo. Crocker of the Southern Pacific.

D. H. Jackson, Supt. Ida Mitchell and Gold Bug mines, Placerville, Cal., has returned home from a prolonged stay at Fresno.

Herman A. Keller, metallurgist, of San Francisco, has sailed for South America on professional business, to be absent four months.

Philip Rearden has resigned the superintendency of the Sulphur Creek, Cal., mines, and will be succeeded by Vice-Pres. Hay of the company.

Capt. Richard A. Parker of the London Exploration Co. has returned to San Francisco from an examination of mining property at Rossland, B. C.

Obituary.

Joel B. Low, an old and respected mining engineer, died at his residence in San Francisco on the 21st inst.

Recently Declared Mining Dividends.

Jersey Leasing Co., Colorado, $8000; payable June 1.

Gold Coin Co., Colorado, 1 cent per share, $10,000; May 25.

Modoc, Colorado, 2 cents per share, $10,000; payable June 1.

Cariboo, British Columbia, $16,000; May 20.

Idaho, British Columbia, $24,000; May 21.

Mammoth, Utah, 5 cents per share, $20,000; payable June 1.

Highland M. Co., South Dakota, $20,000; May 24.

N. Y. & Honduras Rosario M. Co., $15,000; May 20.

Boston & Montana Copper M. Co., $450,000; May 20; $7,625,000 to date.

Recent California Mining Incorporations.

Tanana and Birch Creek D. Co., San Francisco; capital stock, $10,000; subscribed, $70; G. W. McNear, H. Epstein, H. Zadig, S. Erlanger, D. Hirschfeld, H. Wilson, E. Hohweisner.

El Salto M. Co., San Francisco; capital stock, $50,000; subscribed, $1500; H. W. Melendy, D. C. Smith, Jr., L. W. Cheeseman, T. Gilman, N. C. Harris, P. H. Farrell, W. H. Fraser.

California Con. Gold Dredging Co.; capital stock, $1,000,000; subscribed, $1400; J. H. Wise, C. A. Kern, C. M. Reynolds, W. A. Shohon, S, N. Griffith, E. A. Kleigel.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING MAY 10, 1898.

603,673.—Milk Pail Strainer—F. Ansley, Medical Lake, Wash.
603,754.—Plant Support—Clara L. Baldwin, National City, Cal.
603,874.—Testing Apparatus—L. C. Christie, S. F.
603,681.—Telephone Switch—N. Fallek, S. F.
603,816.—Hay Cocker—W. H. Frazine, Montpellier, Cal.
603,770.—Water Wheel—A. Kenney, Los Angeles, Cal.
603,880.—Wine Press—C. K. Kirby, S. F.
603,655.—Gas Generator—C. Ogburn, Phœnix, Ariz.
603,923 — Coffee Roaster — W. R. Ramsey, Keno, Or.
603,711.—Padlock—J. A. L. Snyder, Somis, Ca l.
603,708.—Water Filter—Geo. Schussler, S. F.
603,803.—Dental Impression Material—L. L. White, S. F.
28,578.—Design Concentrator Band—G. Johnston, S. F.
28,601.—Design for Stove—A. B. McMillan, Auburn, Wash.

FOR THE WEEK ENDING MAY 17, 1898.

604,284.—Back Rest for Seats—E. C. Alford, Portland, Ogn.
604,023.—Treating Copper Matte—J. C. Colquhoun, Clifton, A. T.
604,308.—Pocket Cigarette Machine—T. S. Fitch, Oakland, Cal.
604,317.—Fuel—G. Griffiths, Los Angeles, Cal.
604,327.—Removing Drill Rods—J. Hurst, Nelson, Cal.
604,235.—Concrete Structures—D. Jordan S, F.
604,156.—Chair—F. H. Karrar, Roslyn, Wash.
604,054.—Smelting Furnace—H. Lang, Oakland, Cal.
604,118.—Scissors Sharpener—H. C. Lausen, Newman, Cal.
604,211.—Wave Motor—G. Lofgren, Newark, Cal.
604,061.—Concentrator — W. E. Mendenhall, Flagstaff, A. T.
604,123.—Renewing Matrices—Ring & Stickney, S. F.
604,197.—Safety Gas Cock—J. F. Smith, S. F.
604,200.—Bicycle Trainer—H. Vogeler, S. F.

Note.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Wave or Current Motors.—Gustav Lofgren, Newark, Cal. No. 604,211. Dated May 17, 1898. This invention relates to a novel means for applying both the forward and return waves or the force of a current running continuously in one direction for the propulsion of machinery. It consists essentially of a series of vertically adjustable shafts having paddles or floats fixed to them, diagonally disposed sluices, the sides of which are so arranged with reference to the floats that the influx of water in one direction will strike the floats upon one side of the central shaft and cause them to rotate, and the return or reflex wave or current will be so directed as to strike the floats upon the opposite sides and cause them to rotate continuously in the same direction. This is effected by an arrangement of diagonally disposed channels or chutes so fixed with relation to the wheels and the line of movement of the waves that the inflowing wave is directed against one side of the wheel and the outflowing wave against the opposite side, so that an approximately continuous motion in one direction is kept up. In conjunction with this transmitting mechanism is fixed to the upper ends of the shafts, connecting them with a countershaft, through which the power is transmitted.

Books Received.

"*Outline of a Short Course in Qualitative Chemical Analysis, Arranged for Students in the Colleges of Science of the University of California:*" By W. J. Sharwood, Instructor in Chemistry; revised edition, 1898; octavo, pp. 142; a practical work of technical value, sold by the Students' Co-operative Association, Berkeley, Cal., or sent postpaid from this office; price, $1.25.

The New York *Scientific American's* special Navy supplement of April 30 is an unusually fine number, giving a good history of the American Navy for the past fifteen years and illustrating and technically describing the various classes of war vessels, with statistics, and a colored map of Cuba.

Commercial Paragraphs.

The Lunkenheimer Co. of Cincinnati, Ohio, is issuing for the use of engineers a simple and practical chart giving diagrams of a new method of analyzing the movement of the slide valve. Every engineer should have one, as its use will enable him to thoroughly understand the relation between the slide valve and crank movements without the aid of any intricate mathematical calculations whatever. Sent free upon request of any bona fide engineer.

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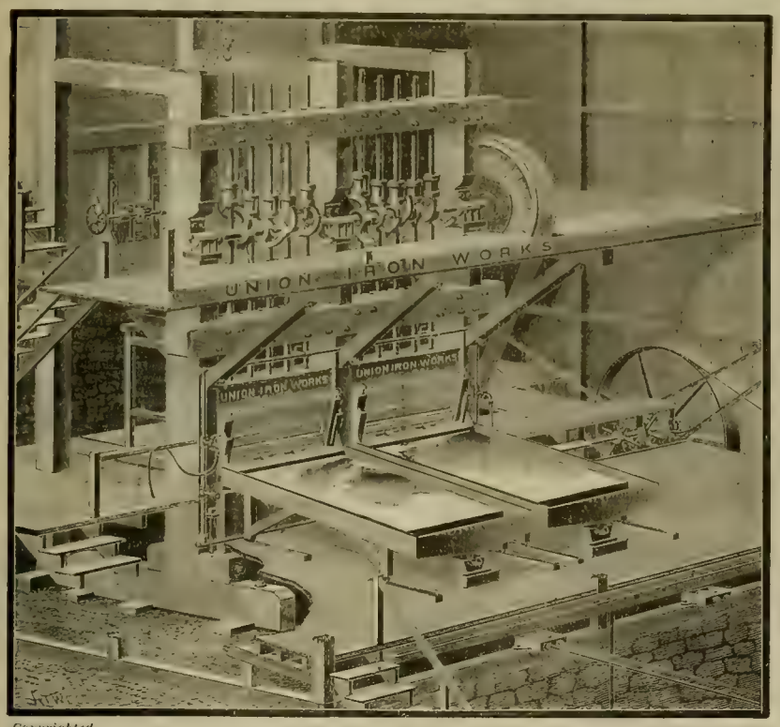
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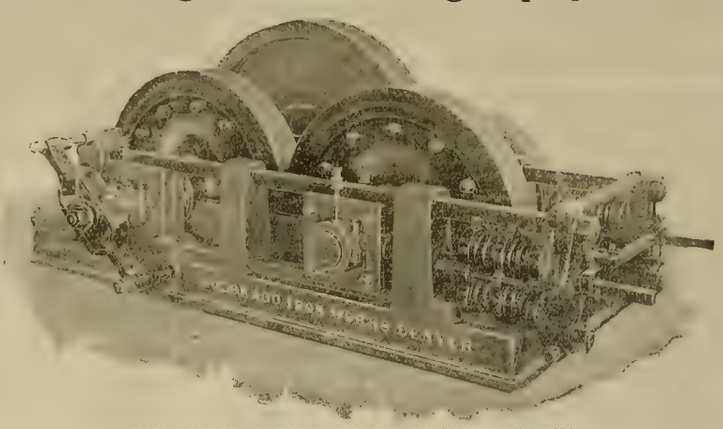
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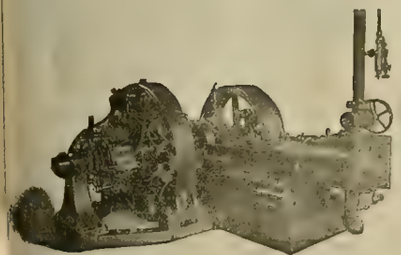
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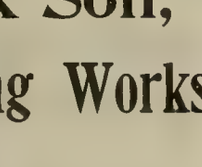
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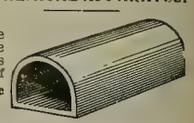
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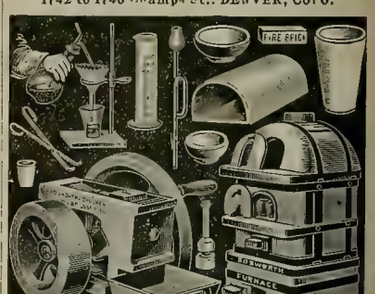
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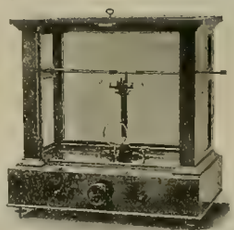
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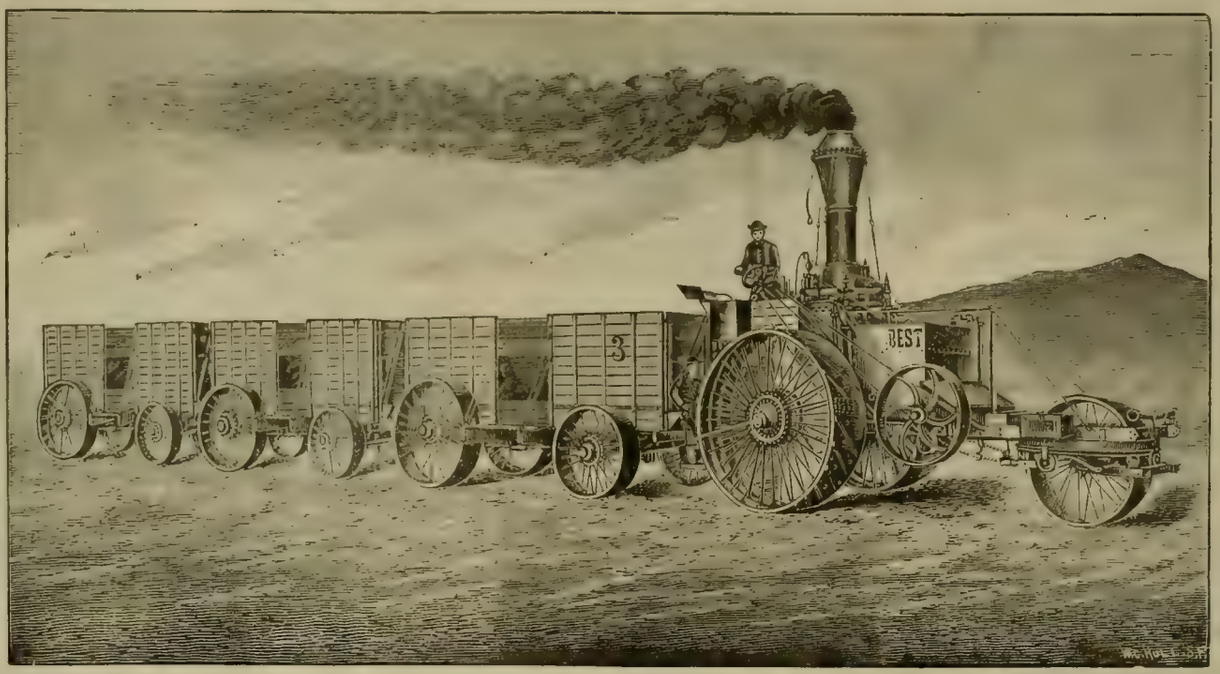
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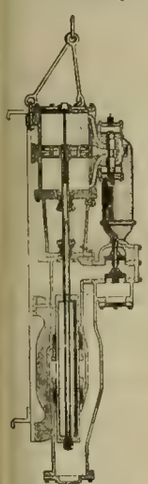
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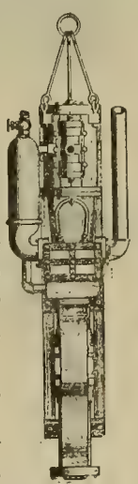
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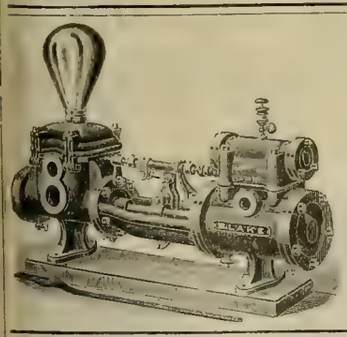
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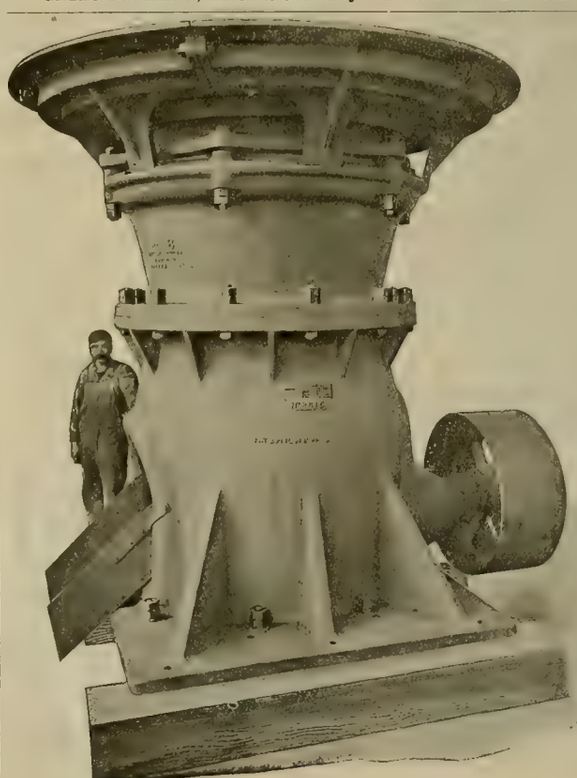
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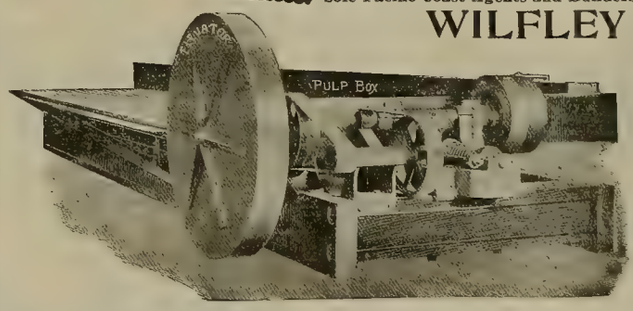
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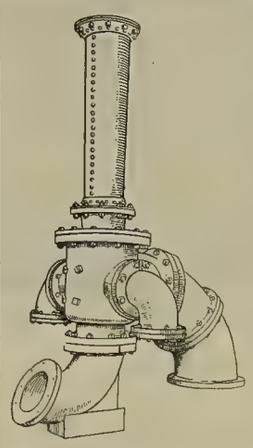


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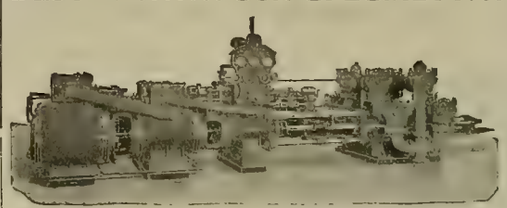
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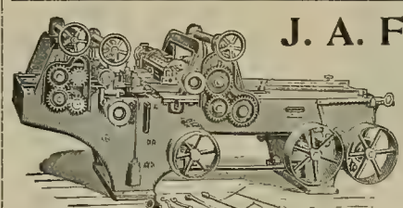
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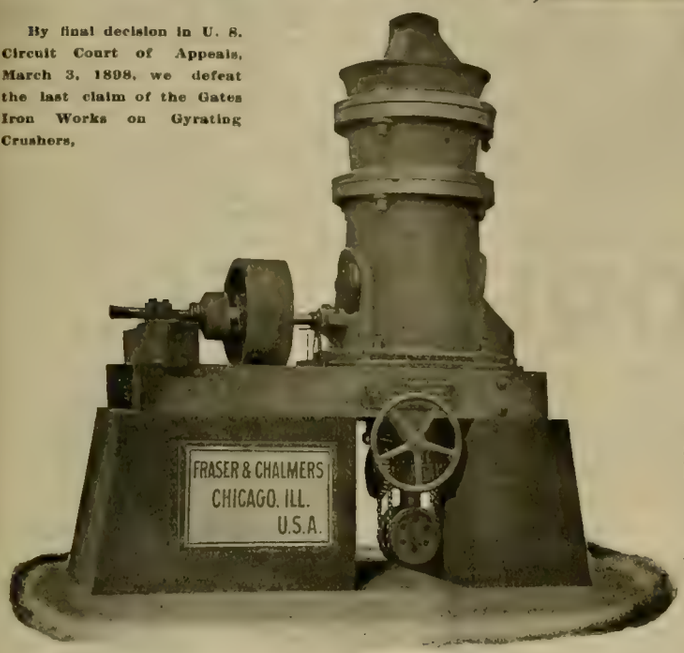


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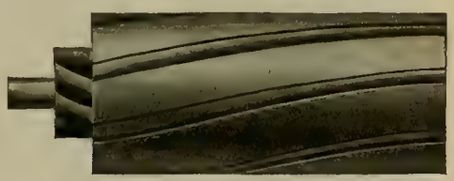
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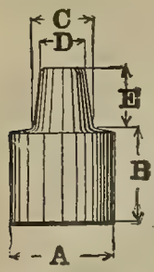
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B=..... "
C=..... "
D=..... "
E=..... "

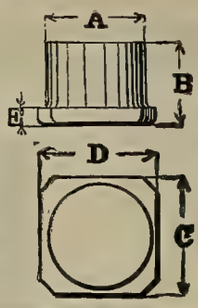
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We beg to call attention to our RISDON HAMMERED PROJECTILE STEEL SHOES AND DIES, which are made of a special quality of steel, are hammered and then compressed in moulds so as to give the greatest possible density.

These Shoes will outlast any other make and will not chip or cup.

We have attached a sketch showing sizes; fill in the size of your Shoes and Dies, and order a trial set.

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C=..... "
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E=..... "

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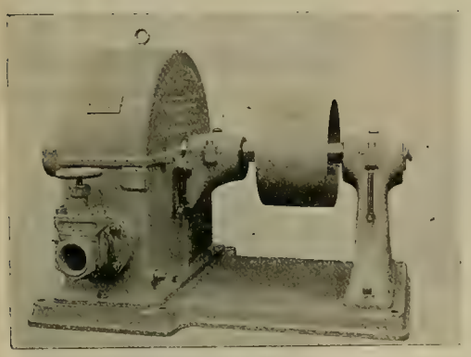
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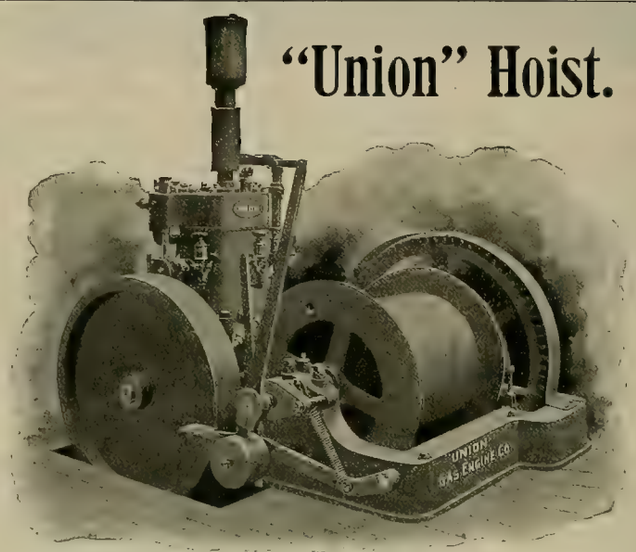
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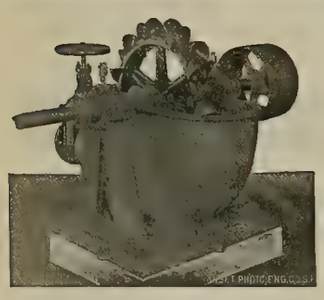
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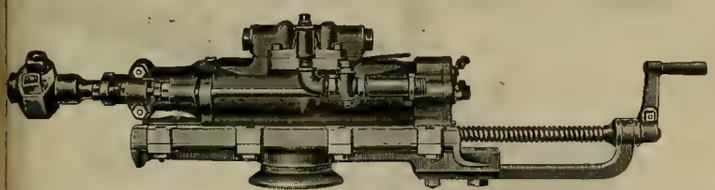
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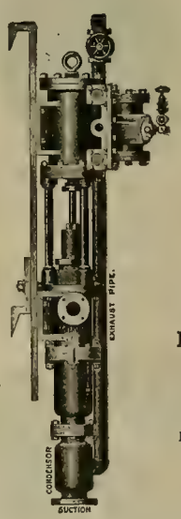
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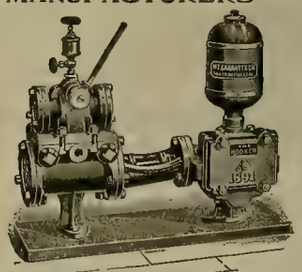
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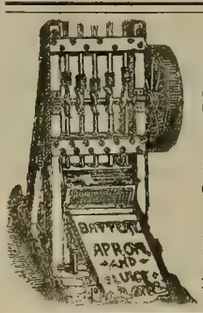
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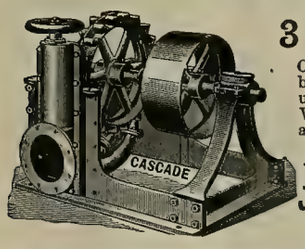
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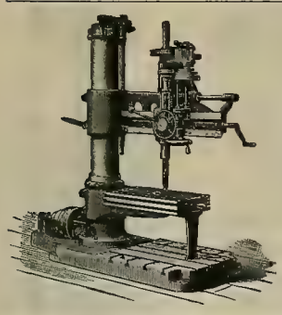


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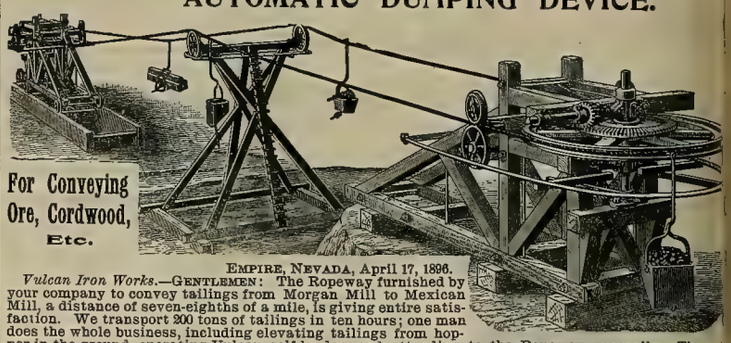
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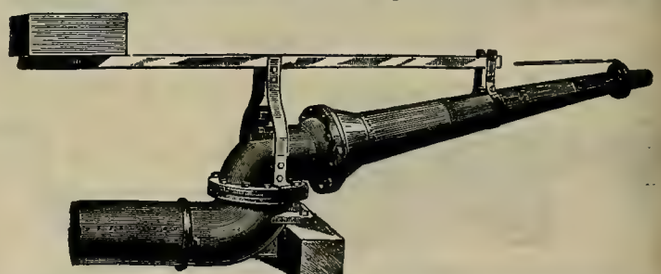
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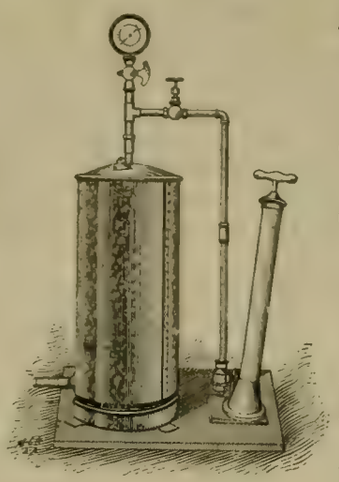
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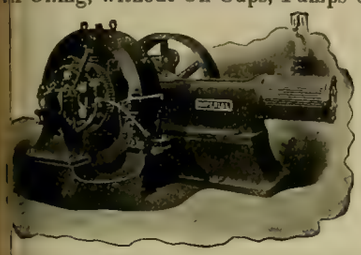
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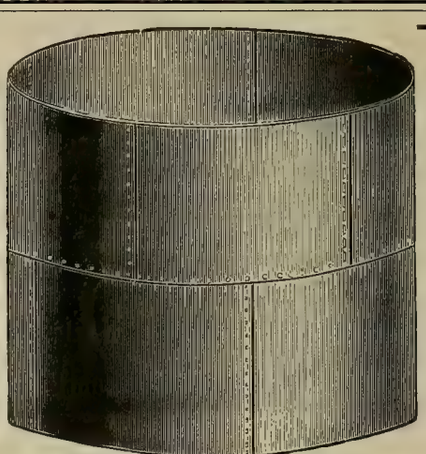
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Water Pipe for Placer, Hydraulic and Quartz Mining A SPECIALTY. Made up complete, or cut, rolled and punched to be riveted at mine.

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Market Reports.

The Markets.

SAN FRANCISCO, May 26, 1898.

Just now coal is king, and wheat is prime minister. Europe must have wheat; warships must have coal. In both cases the United States has all the advantages. This fact alone will avert the threatened "European coalition" against this country. Europe can't afford to antagonize the source of supplies. An American embargo would starve Europe.

Business in general shows improvement. Some lines are dull, principally those requiring investments, because of the many new opportunities which war proffers. A good deal of business time is also devoted to consideration of war news and its attendant requirements.

In Washington it is figured that if the war continues for a year it will involve an expenditure of over $400,000,000. The appropriations already made, or estimated as necessary for that period, are as follows: For the army, estimated, $165,000,000; for the navy, estimated, $75,000,000; emergencies defense fund, appropriated, $50,000,000; army deficiency bill, passed, $25,000,000; naval deficiency bill, pending, $22,000,000; regular army appropriation bill, passed, $23,000,000; naval appropriation bill, passed, $8,000,000; total, $425,000,000.

The optimistic view that Spain will sue for peace as soon as a naval battle is won, and that the war will not last a year, is not shared by men who may be supposed to reflect the views of the Administration. Even should peace be declared in a month or six weeks, the United States will have an expensive and lengthy task before it in establishing a stable government in Cuba and effecting the occupation of the Philippines. There is also a growing feeling that Spain's fleet will not risk a combat with the American navy, and thus the war will be indefinitely prolonged.

The metal market is generally active. Quicksilver is still on the up grade. Local quotations to-day are $42.50, export $37.50 and $38. London reports an advance. An Oregon correspondent writes: "In Douglas Co., this State, there are immense deposits of mercury ores, but of very low grade," and suggests therewith the importance of right concentration methods.

Exports of copper, as per United States Government figures, just issued, were as follows, for nine months ending March 31:

Copper matte, tons—	*1898.*
To United Kingdom	4,089
Germany	2
Other countries	1,738
Total matte	5,829
Copper ingots, bars, etc.—	*Pounds.*
To United Kingdom	47,307,818
France	50,841,860
Germany	21,862,121
Other Europe	88,492,761
British North America	730,736
Mexico	93,875
Other countries	45,320
Total in ingots, bars, etc	209,174,501

The Government also reports imports of copper during March amounting to 10,114,451 lbs. It is understood that most of this was Boleo copper product, coming here to be re-exported to Europe. It is also understood that these imports when again exported were not included in the regular exports for March, as compiled by the Copper Association.

N. Y. City reports Lake Copper $12 bid and $12.10 asked. Tin higher and firm, $14.80 bid, $14.87½ asked. Spelter quiet, $4.25 bid, $4.30 asked. Lead inactive, $3.60 bid and $3.65 asked. Lead is still quoted at $3.50 by the firm fixing the selling price for miners and smelters in the West.

San Francisco prices are not materially changed from last week's quotations. On Nails, list prices per keg, subject to change without notice, are: No. 20 to 60d, Wire, $2.25; Cut, $2.10; 10 to 20d, Wire, $2.30; Cut, $2.15; 8d, Wire, $2.35; Cut, $2.20; 6 and 7d, Wire, $2.45; Cut, $2.30; 4 and 5d, Wire, $2.55; Cut, $2.40; 3d, Wire, $2.70: Cut, $2.55; 2d, Wire, $2.95; Cut, $2.80. In carload lots, 10c per keg less.

On structural material, Chicago quotations are: Beams and channels up to 15 inches, 1.30@1.35c; 18 to 24 inches, 1.40@1.45c; tees, 1.40 @ 1.45c; angles, 1.20 @ 1.25c; universal plates, 1.30@1.35c.

The Manila blockade occasions continuous advance in cordage. Exports of hemp have ceased at Manila, and there has been an advance in its price of 80 to 90 per cent in the American market and of 100 per cent in London. The stocks of Sisal in this country and abroad are light. It is a substitute for hemp, imported chiefly from Yucatan. That has gone up, too. Jute has advanced about 20 per cent in sympathy with the advances in the other products. Tubbs & Co. quote Manila 9¼c, Sisal 8¾c.

Chemicals are unchanged. In cyanide one ten-ton lot was sold in San Bernardino last week by J. Jeffreys of Ontario at 30.3 c. ℔ lb.

Through the week silver was steady. New York quotes 57¼c, London 26½d, local 57⅝. The silver exports from the Pacific coast during April aggregated $347,353, against $449,210 last year, a decrease of $101,857; for four months the exports were $2,098,832, against $3,726,603 last year, a decrease of $1,627,771. Last week the Bank of England paid 77s 10d per ounce for bar gold. This is believed to have been unprecedented and illustrates the great lengths to which the bank has gone in order to secure specie.

M. CRAFFEY,
Manufacturer of the Celebrated
Smelter Broom,
1554 BLAKE ST.....DENVER, COLO.

Mining Share Market.

SAN FRANCISCO, May 26, 1898.

Margin stocks were largely closed out during the week, but beyond that there was little that could be considered business. Much that was hoped for a year ago has not materialized, and the stock business is practically dead. Next Tuesday the old San Francisco Stock and Exchange Board will extend its business to include dealings in local and Eastern railroad, gas, water, sugar, powder securities, bank and insurance shares, United States, State and municipal bonds. New auxiliary members will also be admitted. The only attention recently attracted to the Brunswick operations is the discontinuance of all Sunday work thereon.

The Sierra Nevada has been doing well since the extraction of ore began from the Riley tunnel, about $19,000 gold having been received therefrom. The bullion yield from the Con. Cal. & Va. ore worked at the Morgan mill shows that 750 tons yielded bullion of the gross assay value of $15,696 30, of which $8366.87 was gold and $7329.43 silver. The yield in bullion per ton was $20.95. The assay value of the ore per battery samples averaged $27 per ton. The assay value of the ore per railroad car samples averaged $31.47 per ton.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 26, 1898.

9:30 A. M. SESSION.

50	Con Cal & Va	47	100	Sierra Nevada	56
100	H. & N	89	100	Standard	1.50
500	Justice	09	100	Yellow Jacket	23

SECOND SESSION—2:30 P. M.

300	Ophir	38	300	Yellow Jacket	22
400	Gould & Curry	23	200	Belcher	09
300	Con Cal & Va	53	400	Sierra Nevada	55
500	Savage	11	900	Overman	08
500	Chollar	17	250	Alta	11
200	Crown Point	10	200	Standard	1.50

STOCKHOLDERS' MEETING.

Notice is hereby given that the regular annual meeting of the NATIONAL CONSOLIDATED MINING COMPANY will be held at the office of the company, 916 Market Street, Rooms 56 and 57, in San Francisco, on MONDAY, the 6th day of June, 1898, at 8 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may properly come before the meeting.

By order of the Board of Directors.
G. W. FLEISSNER, Secretary.
San Francisco, May 12th, 1898.

Working Capital for Mines.
PACIFIC EXPLORATION COMPANY
Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 29-30 Chronicle Building, S. F.

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RAILROAD
AFFORDS THE BEST ROUTE TO THE GREAT NORTHWEST.
Is the only line operating through Pullman Palace and Tourist Sleeping Cars from Denver to Portland, Oregon.
THE GREAT GOLD MINING DISTRICTS
—OF—
MERCUR (UTAH), KOOTENAI, KLONDIKE,
Are best reached via
THE OREGON SHORT LINE RAILROAD.
IRRIGATED LANDS OF IDAHO.
Thousands of acres of the choicest lands of the West are located along the line of
THE OREGON SHORT LINE RAILROAD
In Utah, Idaho and eastern Oregon. Splendid opportunities for the Investor, the Farmer and Fruit Raiser.
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THE OREGON SHORT LINE RAILROAD.

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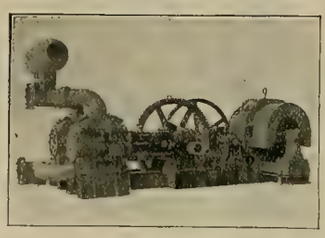
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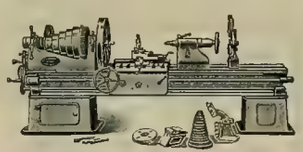
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The Latest and Best.
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POWER REQUIRED.....only 2-horse.
TOTAL WEIGHT.....only 2¼ tons.
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NO NOISE—NO VIBRATION—NO JAR.
More than double screen surface with one-quarter power and less than one-half wear and tear of ordinary Stamp Battery. Can be set up in 24 hours.
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By Aug. J. Bowie, Jr. On the use and construction of Ditches, Flumes, Dams, Pipes, Flow of Water on heavy grades, methods of mining shallow and deep placers, history and development of mines, records of gold washing, mechanical appliances, such as nozzles, hurdy-gurdys, rockers, undercurrents, etc.; also describes methods of blasting; tunnels and sluices; tailings and dump; duty of miners' inch, etc. Price, postpaid.....$5 00

Assessment Notices.

RED CAP MINING COMPANY. LOCATION of principal place of business, San Francisco, California; location of works, Red Cap Creek, Humboldt County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of April 1898, an assessment (No. 3) of two dollars per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, 125 Beale St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 27th day of June, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. H. MARTIN, Secretary.

Office 125 Beale St., San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 10th day of May, 1898, an assessment (No. 1) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 218 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 5th day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—218 Jackson St., San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 916 Market street, Room 57, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of June, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 23rd day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—No. 916 Market street, Room 57, San Francisco, California.

LEON GOLD MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, near Winchester, Riverside County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 1) of 1½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Room 7, fifth floor, Mills building, San Francisco, California.



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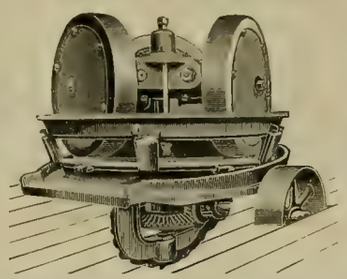
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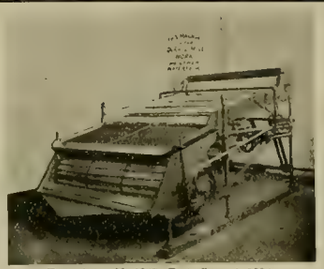
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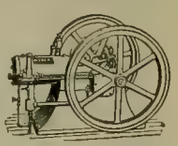
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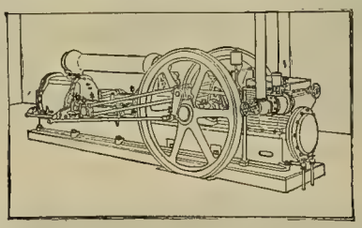
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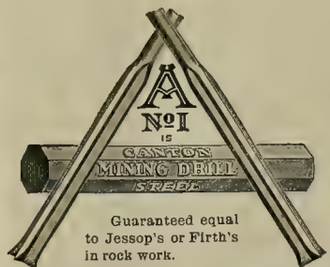
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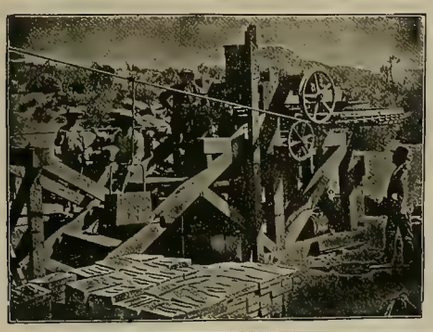
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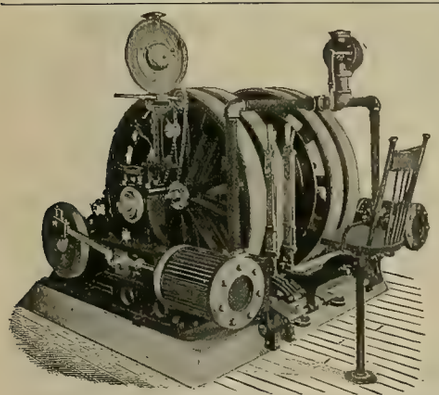
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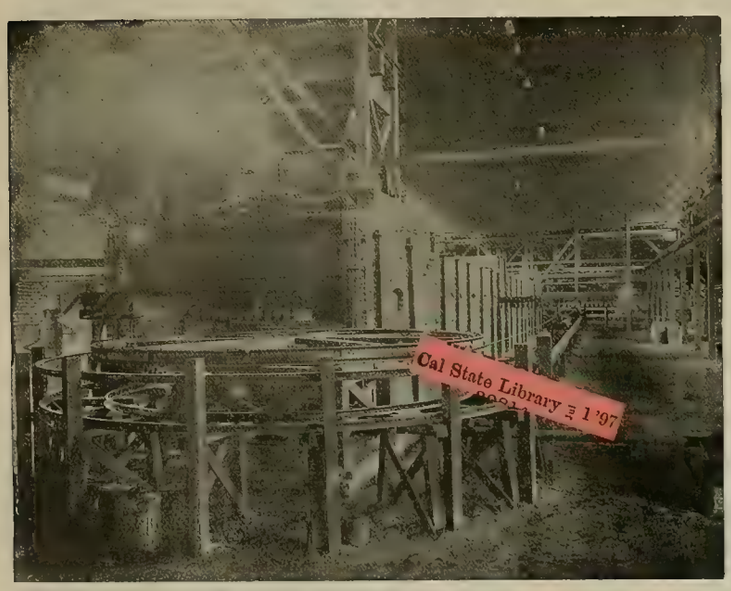
Bolthoff Lightning Quadruple Friction Hoist.

Requires less power to apply and gives better contact for friction surfaces than the double friction types. By carrying the brake band between the frictions the strain is reduced to a minimum.

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"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.

"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The **ROPP FURNACE** is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal. (two furnaces); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); Broken Hill Proprietary Co., Broken Hill, New South Wales (four furnaces); Puget Sound Reduction Co., Everett, Washington; Colorado Ore Sampling & Reduction Co., Cripple Creek, Colo.; Consolidated Kansas City Smelting & Refining Co., for the Arkansas Valley Smelting Works, Leadville, Colo.; Robert Lanyon's Son's Spelter Co., Iola, Kansas (two furnaces); Mountain Copper Co., Ltd., Keswick, Cal.

Catalogue on Application.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with State Law.

FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco.

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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

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Some Shasta Co., Cal , Mines.

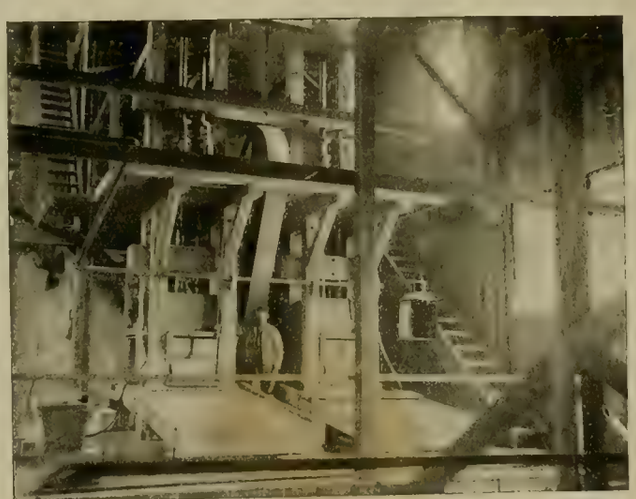
The early days of placer mining in Shasta Co. are giving way to quartz mining. The statistics published in last week's issue showed Shasta Co. to be first in the list of California mineral producing counties in aggregate value of production. As in other sections of the State, energetic work has shown that the surface yield of the old mining era was but an indication of the hidden values beneath.

Illustrative of this may be instanced the "Old Diggings" district, where the Texas Consolidated Mining Co. pioneered quartz mining in a section which, as its name implied, was old placer ground. A 20-stamp mill—the Hart—was built and supplied with ore from the adjoining properties of the company. At "Old Diggings" are also the extensive low-grade ores of the Mammoth, which has recently furnished 100,000 tons to the Mountain Copper Co., without much perceptible diminution of the quartz body in sight. At French Gulch the Gladstone mine, also illustrated herewith, now owned by the Euclid G. M. Co. of Cleveland, Ohio, has turned out about $500,000, twenty stamps crushing ore so "free milling" that concentrators are not used.

Near French Gulch is the Milkmaid mine, where a 10-foot wide vein of high-grade milling ore has warranted the erection of a stamp mill of ten 2-stamp batteries. An interior view of the arrangement of this mill is given. Near French Gulch is also the Niagara, a quartz mine that has produced over $2,000,000, and which gives promise of profitable yield at greater depth.



GLADSTONE MINE, FRENCH GULCH DISTRICT, SHASTA CO., CAL.



INTERIOR VIEW OF THE MILKMAID MILL, SHASTA CO., CAL.



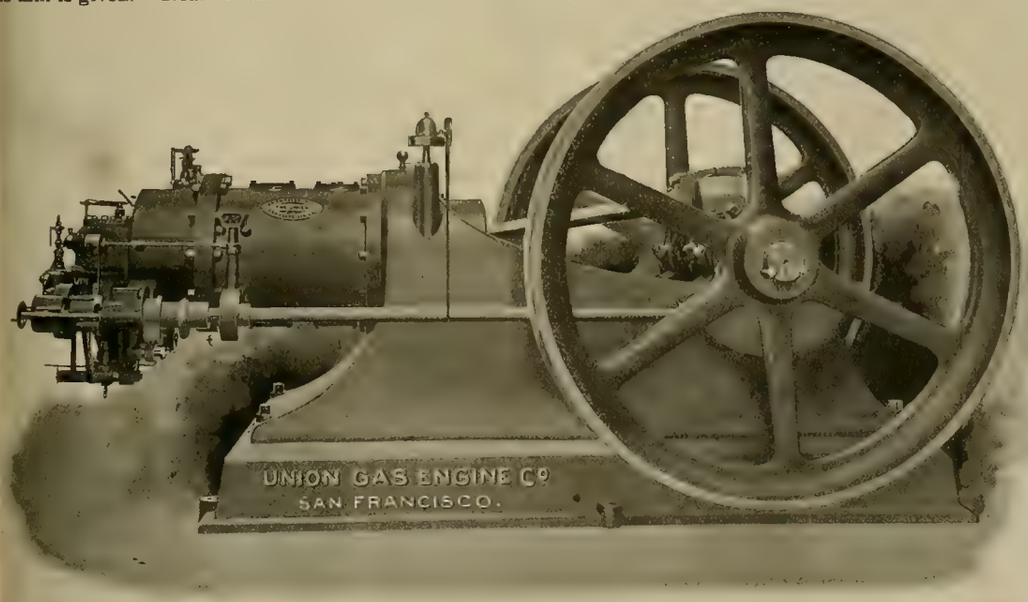
THE HART MILL, OLD DIGGINGS DISTRICT, SHASTA CO, CAL.

Latest Type "Union" Gas Engine.

A recently designed "Union" gas engine, 60 H. P., is of interest, showing the progress made in the design and construction of these motors by the Union Gas Engine Co. of San Francisco. Its features are the same as in all the most recent "Union" engines. The liquid gasoline or benzine is piped to the inlet at the head of the engine. It is turned into gas only as wanted, and when drawn into the cylinder a large quantity of air is drawn in through the air valve, which valve is operated by a cam. The gas valve is normally closed and only opened when the engine requires a charge. This is controlled by the governor, which in turn can be set to run the engine slow or fast as desired, and being sensitive, the gas consumption is reduced to the minimum, only enough being admitted to the cylinder to keep the speed of the engine at the required point and always in proportion to the work performed.

Ignition is by electric spark, which can be adjusted so as to get the expansion on any part of the stroke desired, which is considered as great an advantage as a "cut-off" on a steam engine. No residue of burnt gases remains in the cylinder to mix with the new charge, all the burnt gas being expelled and its place taken by pure air, an economy, for there being nothing in the cylinder but combustible gas and air the maximum power can be obtained at small expense.

A 60 H. P. at H. Dutard's, near Campbells, Santa Clara Co., Cal., running a centrifugal pump against about 110 feet head, and indicating about 65 I. H. P., uses $4\frac{8}{10}$ gallons common stove gasoline per hour. Each engine over 20 H. P. is fitted with a self-starting device by which the engine can be started by opening a valve, the same as a steam engine. The weight of the engine shown in the cut is about 16,000 pounds.



SIXTY H. P. "UNION" GAS ENGINE.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent.

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J. F. HALLORAN.....Publisher

San Francisco, June 4, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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ELSEWHERE appear some adverse comments on the manner of conducting the State Mining Bureau. The same matter was given editorial comment some months ago. It is to be regretted that so admirable and valuable an adjunct of the mining industry should have seemed fallen so far from its former high stand of efficiency, and, probably, the charity of silence is the most fitting comment. While, personally, the State Mineralogist is a worthy gentleman it is possible that he has failed to grasp the requirements of his present position, and that he is not acting in defiance but in ignorance of them.

THE usual marine disaster is reported befalling an unseaworthy vessel en route to Alaska gold fields. This time it is the schooner Jane Gray, which left Seattle, Wash., en route to Kotzebue sound, May 22, and three days afterward foundered at sea, with a loss of thirty-four lives. So much has been said about the folly of embarking on crazy old craft that it seems useless to more than casually refer to the recurrence of such dismal news. If men are determined to try for fortune in that far-off region they should at least take ordinary precaution for safety. So far there have been a hundred times as many Americans lost in the rush to the Klondike and northern Alaska as have been killed in the war with Spain.

WAR and its attendant excitement helps and hinders mining enterprises: helps in general by more active demand and hinders by individual distraction. Numerous projects involving the expenditure of considerable money have been sidetracked or diverted temporarily till comes the cooler atmosphere of peace. A case in point is sufficiently illustrative. Sixty days ago a mining superintendent said to the writer: "In about six weeks I will be through here, and shall put $12,000 in bond and development of a good Tuolumne Co. prospect." On Wednesday of this week he wrote: "Have just received a letter from the man who stood ready to put up the necessary money. He's been appointed Brigadier General by the President and says 'must wait till war is over.'" From present indications the Spanish matter will be speedily settled and then it is believed there will be even more activity than before in mining development.

Digest of Decisions.

In response to widely scattered and numerous inquiries it is deemed worth publishing a digest of the most recent decisions regarding mineral lands and mineral claims, made by the Secretary of the Interior and the General Land Office:

The existence of a mineral location raises the presumption that the location has been made in conformity with law, and that the land covered thereby is mineral in character.

Where mineral is found, and it appears that a person of ordinary prudence would be justified in further expenditure with a reasonable prospect of success in developing a mine, the land may be properly regarded as mineral in character.

A hearing will not be ordered on an allegation that a tract of land, embraced with a certified list of State selections, was not, on account of its prior known mineral character, intended to be granted to the State, except upon a strong prima facie showing in support of such allegation.

The burden of proof is properly upon one alleging the mineral character of a tract that has, prior thereto, been adjudged agricultural.

If the burden of proof as to the character of land s improperly placed, and accepted as placed without objection, the party so relieved from said burden is not in a position to complain of such action on appeal, in the absence of an attempt in the appellate tribunal to shift the burden, and apply the changed standard to the record made on the hearing in the local office.

In case of an attack on a mineral location of land that has once been adjudged mineral in character, the abandonment or forfeiture of the claim must be shown by clear and unmistakable evidence.

The non-mineral character of a tract of land having been determined as the result of a hearing held on that issue, the Department is not justified in ordering another hearing on the same issue, in the absence of a clear showing of development made since the prior hearing, such as, if supported by the evidence at the hearing applied for, would clearly demonstrate that since such prior hearing mineral has been discovered in such quantities, and by such thorough work on the premises, as to overcome the effect of the previous judgment as to the character of the land.

In a hearing ordered to determine the alleged known mineral character of land embraced in an agricultural entry, made at the conclusion of a prior contest involving the character of the land, the evidence must be confined to discoveries after the date of the first hearing, and prior to the allowance of the entry.

The notice of an application for a mineral patent should, in stating the names of adjacent claims, include unsurveyed as well as surveyed claims.

Failure to include in the posted and published notice of a mineral application the names of the nearest or adjacent claims, in strict accordance with paragraph 29 of mining regulations, will not render new notice necessary, where the notice as given is substantially in conformity with the practice heretofore observed under said paragraph.

Judicial proceedings are not effective as against an application for mineral patent if not based upon an adverse claim as provided by statute.

The failure of a claimant under a mineral location to make objection to the allowance of an agricultural entry of the land is conclusive as to the right of such claimant to be heard.

On appeal from the refusal of the local office to entertain a protest against a mineral application, the appellant is not required to serve the applicant with notice thereof.

Continuous possession of a mineral claim, with due compliance of law, for a period equal to the time prescribed by the statute of limitations for mining claims, in the State wherein such claim is situated, entitles the claimant, under the provisions of section 2332 R. S., to a patent in the absence of any adverse claim.

Prior to the approval of a railroad indemnity selection, the land included therein, if mineral in character, is open to exploration and purchase under the mining laws of the United States.

A surveyor-general who orders and approves the survey of a mineral claim is disqualified as applicant therefor under the provisions of section 452 R. S., and the department regulations thereunder, while holding such office.

A discovery of mineral on each twenty acres of a placer location serves to except the whole location from school indemnity selection.

Prior to the passage of the Act of August 4, 1892, there was no authority to locate and purchase lands chiefly valuable for building stone under the placer mining laws.

The Land Department has no jurisdiction to correct an alleged erroneous survey of a patented placer claim, while the patent is outstanding, so as to include land not applied for or surveyed.

Each of the above paragraphs is the summing up of a decision or ruling made in the particular case discussed.

Mining on Spanish Grants.

Among the subjects that will come before the Mining Congress at Salt Lake in July is the Ferguson bill, concerning the regulation of mining on Spanish grants. The first section of the bill reads: "That hereafter all mines or deposits of gold, silver, tin, antimony, zinc, bismuth and other valuable mineral deposits, situated within the boundaries of any land the title to which is derived from the government of Spain or Mexico, by grant thereof made prior to the conclusion of the treaties between the United States and the Republic of Mexico, on February 2, 1848, and December 30, 1853, respectively, and now embraced within the territories of New Mexico and Arizona, or within the States of Utah, Nevada, Colorado or Wyoming, are hereby declared to be free and open to exploration and purchase, and the lands on which they are found to occupation and purchase by citizens of the United States and those who have declared their intention to become such under the mining laws and the provisions of this Act." The passage of this bill, says the Denver *Mining Record*, would work no hardship to grant owners and would be a great stimulus in the development of a large amount of valuable mineral territory in the States named. The old system of Spanish grants was iniquitous and characteristic of the tyranny of that yellow nation. Undeveloped mineral is worth nothing to anybody, and when large areas containing such wealth are held arbitrarily without development the miner should be allowed to go in and prospect and purchase whatever territory he may find desirable for development. The original theory of the grants was that the lands were non-mineral, and had the United States Government regarded them otherwise proper precautions would have been taken to protect the miner in his mineral rights. Though a little late, there is yet time to do something in this direction.

THAT in the same river channels smaller pieces of water-worn gold are purer than the larger ones, and that the exterior layer of the water-worn nuggets is finer than the interior, is probably easiest explained by the fact that native gold always contains silver, and, on the average, about one-tenth of a nugget is silver. This is much more easily corroded than the gold, and is attacked, for example, by sulphureted hydrogen, and by common salt, both ordinary ingredients of surface waters. Such substances act upon the silver close to the surface of a nugget and dissolve it away, or convert it into brittle compounds which wear away as the nugget is rolled forward beneath the heavy stones at the bottom of a stream.

MINERS in the State of Washington have petitioned Congress to suspend the requirement of $100 worth of work or improvements on unpatented mining claims in that State for one year. It is not likely Congress will accede to the request. Such action would be of no benefit to any one. The laws are liberal, and in general any one who cannot or will not meet its requirements should let go. It is injurious to the mining industry and inimical to the prosperity of any locality to permit the continuous holding of unpatented mining claims without doing anything to justify such retention.

NEGOTIATIONS for the English purchase of the Redington, Cal., quicksilver mine, which have been in progress for some time, have not yet been closed. A. McMillan of Oakland, Cal., is the owner. The price of the property is $150,000.

California Mineral Land.

The mineral land bill of which so much was once expected has apparently been side-tracked in Congress by war matters. Apart from Federal legislation regarding railroad grants it is evident that the absorption of the mineral area in other ways needs attention. On this subject a recent writer says:

It is too bad that so much of the mineral land of this State has been permitted to fall into the hands of those for whom it never was intended. Aside from the wholesale absorption in appropriation by railroad companies of very large tracts, isolated sections all over the State, even in the center of the well-known mineral belt, have been taken up by people who do not intend to use the land for mining purposes. Small ranches or farms, orchards, pastures, etc., occupy the space in the mountains and foothills where mining plants should be found. All this is largely due to our poor system of determining and defining mineral lands by which it is not difficult to acquire them under false pretenses. Unless some one is sufficiently interested in a tract to enter a protest and maintain a contest before the land office the land even if notoriously mineral passes to the agricultural claimant or the owner of lieu land, school or other scrip. In some parts of the State, notably along the mother lode region, large tracts of exceedingly valuable mineral land are held under agricultural title acquired years ago when no one entered a contest against the applicant. Now, the prospectors are not permitted by the owners to go on to this land and prospect, and the domain of the prospector is thus narrowed and restricted right in the midst of the generally recognized and well-known mineral belt.

The *Mountain Echo*, in speaking of this gross injustice, says it has been carried on extensively in the southern part of Calaveras as well as in portions of Tuolumne county:

The Government is not aware of it, and the ordinary mortal in search of mining prospects, ignorant as how to proceed against the "grabbers," stands idly by, willing, but unconscious as how to act, in order to restore these valuble mineral lands to the public domain for the benefit of the prospector. The Government in disposing of the lands was defeated in receiving the established price of the lands, because of misrepresentation by unscrupulous sharks, and no contest being made, the purchases were made and the transfers confirmed. This vile work has been going on for some time, but an investigation will shortly be demanded, and men of character will give testimony in behalf of the Government as against the land grabbers, and results not now dreamed of by the general public will be brought about, and somebody and somebody's agents are going to suffer the penalty of the law.

Upon this subject A. H. Ricketts, of San Francisco, supplies the following, which, so far as known, is the first authoritative digest of law and fact published thereon:

All patents issued by the Government of the United States to pre-emption or homestead or townsite applicants are incontestible under the Act of Congress of March 3d, '91, unless suit was brought by the United States to vacate and annul the patent within five years from the passage of that Act if the patent was issued within five years before the passage of that Act. Under the provisions of that Act such suit must be brought within six years after the date of the issuance of the patent on all patents issued after the date of that Act.

This Act does not apply to Railroad and Wagonroad patents, which are subject to the provisions of the Act of March, 2d, '96, which extended the time within which such suits may be brought to six years after that date.

In commenting upon the Act of '91, the United States Supreme Court says: "Under the benign influence of this statute it would matter not what the mistake or error of the Land Department was, the patent would become conclusive as a transfer of the title, providing only that the land was public land of the United States and open to sale and conveyance through the Land Department. The purpose of Congress was to uphold titles arising under certificates or patent by providing that after a certain time, the Government, the grantor therein, should not be heard to question them."

Under the Act referred to the United States is barred from attacking the validity of patents issued for hundreds of thousands of acres of land in this State as non-mineral land, which area is, perforce, constantly increasing, and which in fact should be the lawful heritage of the miner and the prospector.

Of course, this bar applies equally to persons who might have been entitled to avail themselves of rights existing in the Government.

Railroad and Wagonroad patents are still subject to attack irrespective of the date of any of the patents as the statute of limitations has not yet run in their favor.

In the case of lands lying within the 16th and 36th sections, commonly called school lands, an action may be commenced at any time by persons who may hold mining claims therein although patent has issued therefor from the State. This, upon the theory that the mineral lands were excluded from the grant to the State and the attempt by it to grant the same is void. The question, therefore, to be determined in an action of this character is whether the land was known to be valuable for minerals at the time of the grant (March 3d, '53); if it was, the title still remained in the United States, and the State could take other lands in lieu thereof.

The important difference existing between patents issued by the United States to non-mineral applicants and the grant to the State is, that in the latter case the Land Department is not called upon to determine the character of the land, and the conclusive presumption that the land is of a certain character is not indulged in in school land cases. But where lands are selected by the State as in lieu of other lands the approval of the selection by the Land Department and the listing by it to the State, is equivalent to a patent. In that case it would seem that the Act of '91 would apply.

A Great Industry.

In last week's issue was published statistics in detail of the mineral yield of California and Colorado for the calendar year 1897, showing an aggregate mineral yield for that year of $25,142,441 for the former and $35,964,033 for the latter State. Other American commonwealths exceed even these figures. The national aggregate exemplifies the great extent and importance of the mining industry and justifies the effort to have proper national recognition by the creation of a Secretary of Mines and Mining, to have a place in the President's Cabinet.

Under date of May 25 are received advance sheets of Volume VI of the Mineral Industry, which makes a good presentation of the year's work, and which is approximately correct, and furnishes further argument for the fostering of so great a factor in the nation's wealth. In these is found a mass of carefully prepared figures and explanatory comment thereon, some of which is quoted as illustrative of the greatness of the mining industry of the United States.

The total value of the mineral production of the United States in 1897 was $746,230,982 as against $737,958,761 in 1896. The total value of the output in the last mentioned year exceeded that of the mineral and metal production of all Continental Europe, and nearly doubled that of the United Kingdom, the value of whose mineral output that year was approximately $340,000,000, that of Germany, $300,000,000, of France about $110,000,000, and of Belgium, $100,000,000.

The figures given for '97 in connection with the United States are limited entirely to ores and other substances mined in the United States and to metals reduced from those ores. In addition, there was also a large quantity of metals reduced or refined in this country from imported ores or base bullion. These are chiefly sent here for treatment from Canada and Mexico. The total production of this class reported was 584,983 ounces gold; 40,218,776 ounces silver; 26,938,254 pounds copper; 4,099,390 pounds nickel; 92,117 short tons lead; the total value of these metals being $47,127,174. This output of U. S. metallurgical works is altogether additional to that recorded in the table.

These metals were obtained chiefly from ore, bullion, furnace products and silver-lead imported from Mexico, Newfoundland and Canada. A comparatively small amount of gold and silver ore and bullion comes from Central and South America. There is also received a large amount of pyrites from Spain and Portugal, all of which contains a little copper. From British Columbia and Mexico come chiefly lead-bearing ore and silver-lead, from which a large part of the lead supply is obtained. The nickel is all from ores or matte produced by the mines at Sudbury, Ont. In the above quantities is not included the iron smelted from foreign ores, which is small in actual amount and insignificant in comparison with the total output; nor the manganese in foreign ores which enters into the composition of the spiegeleisen and ferro-manganese that is made here. The lead industry is the one most affected by the foreign material that is imported, the quantity of copper being comparatively small.

Aluminum.—The production in 1897 was 4,000,000 pounds ($1,400,000), as against 1,300,000 ($520,000) in '96.

Antimony.—The output increased from 1,226,000 pounds ($84,717) to 1,500,000 ($107,250). This was produced chiefly from imported ores; the production of domestic ores increased from 150 tons to 500 tons.

Copper.—The increase in production from 479,806,183 pounds in 1896 to 510,190,719 pounds in 1897 came chiefly from the mines of Arizona, Montana and California.

Gold.—The production in the United States increased from 2,558,433 troy ounces ($52,886,209) in 1896 to 2,864,576 ($59,210,795) in 1897. American refiners turned out 584,983 troy ounces ($12,091,599) of fine gold from ores and bullion imported chiefly from Canada and Mexico, making a total addition of $71,302,394 to the domestic supply of gold during the year.

Iron.—The make of pig iron in the United States increased from 8,623,127 long tons ($91,577,610) in 1896 to 9,652,680 ($92,677,312) in 1897. The production of iron ore was 16,000,056 long tons ($31,200,889) in 1896 and 18,316,967 ($31,138,844) in 1897. Upward of 66 per cent of the production of iron ore was from the Lake Superior region. The production of pig iron in 1897 was the largest for any single year in the history of the United States.

Lead.—The production of lead from ores mined in the United States increased from 174,692 short tons ($10,411,643) to 197,718 ($11,784,093). Besides this, there was a large amount of lead ore and silver-lead imported from British Columbia and Mexico and smelted and refined in the United States, part of it being re-exported.

Platinum.—A small amount of platinum is obtained annually in California as a by-product in the refining of gold bullion, estimated at 200 troy ounces in 1897, the same amount as in the previous year. The Director of the Mint reports also the production of 20.25 troy ounces of iridium.

Quicksilver.—The output fell off from 29,863 flasks ($1,104,997) in 1896 to 26,079 ($991,002) in 1897. There have been no new discoveries of late years in the United States which have come to anything, and the entire production continues to be from California.

Silver.—The domestic production decreased from 58,488,810 troy ounces in 1896 to 56,457,292 troy ounces in 1897. This large decrease is attributable to the heavy decline in the value of silver, which compelled a good many mines (whose ores contained their chief value in silver) to close down, especially such mines as the Ontario and Daly of Park City, Utah. The falling off in production would have been much greater had it not been for the comparatively high prices for lead and copper which stimulated the production of those metals, and, consequently, the silver carried with them. There was, therefore, a large increase in silver production from Butte, Mont., and the Cœur d'Alene. Colorado and Utah showed a large falling off in production, while there was an increase from Montana and Idaho. Besides the silver produced from ores mined in the United States, American refiners turned out 40,318,776 troy ounces of silver derived from ores, bullion and silver-lead imported from Canada and Mexico. The average price of silver in New York was 59.79c per fine ounce in 1897, against 67.1c in 1896.

Zinc.—The production increased from 77,637 short tons ($6,117,796) in 1896 to 100,387 ($8,271,889). This huge increase, which took place especially in the western districts, was brought about by the high price established for the metal by a combination of part of the producers and the establishment of several new works, and enlargement of the capacity of others, outside the combination. The production in 1897, which was thus increased so heavily, far outstripped consumption, and as a result the combination was obliged to market a good deal of its spelter abroad at comparatively low prices. The exports for the year were larger than ever before in the history of the United States. The final outcome was the disruption of the combination.

THE latest mining scheme is that of a Los Angeles, Cal., concern, which announces its object to be "to make mining a safe and legitimate business," which is a laudable object. The plan, as outlined in the prospectus, is "to offer to the miner or speculator every opportunity of gain, and at the same time secure him against the possibility of loss," a pleasing but impracticable programme. The following excerpt will be read with amusement by mining men:

We desire to call your attention to a few mines that have come under our immediate observation. The Utica mine, in this State, was bought for less than $3000, and is paying from $300,000 to $500,000 per month. What a royal revenue for so small an investment! The borax mines near Daggett were bought for $2400, and have paid $50,000 per month for twelve years. So, you see, with a small sum invested with us, you may acquire a competency for life with no risk of your capital.

The Emery Wheel and Its Manufacture.

The two abrasives which give the emery wheel its grinding and polishing qualities are emery and corundum. These two substances are practically the same abrasive, for the part of the emery that does the work is corundum. Emery is a mixture of corundum and the so-called oxide of iron—Mother Nature being the mixer. According to Prof. Dana, corundum has very little iron, while emery will average 46 per cent of the oxide. Emery therefore has a very dark gray, almost black color, while corundum is very light gray, with bluish and ruby colored tints. In almost any fair sized sample of corundum stone there are distinct traces of sapphire and ruby. Emery is mined in Turkey in Asia, in the island of Naxos, and in Chester, Mass. The Chester emery has a larger percentage of corundum than the foreign emery.

Corundum is found in commercial quantities in North and South Carolina, Georgia, Alabama and Tennessee. Corundum being free from an excessive percentage of foreign matter, possesses greater polishing and grinding qualities than emery. In the arts and sciences corundum is rated next to the diamond in hardness, emery coming next to corundum. Both emery and corundum are prepared for use in about the same way. They are crushed down to different degrees of hardness, and after being cleaned are graded in different sizes, ranging from No. 6 to the finest flour. These sizes take their name from the number of meshes to the linear inch of the wire cloth through which they are graded. The coarser sizes are used mostly in making emery and corundum wheels. The principal reason why more emery than corundum is used is the difference in cost, the miners of emery ore in Turkey receiving but 6 or 7 cents a day, while the minimum wages paid to miners of corundum in this country is 70 cents a day.

Another reason for the greater cost of corundum is the fact that emery ore is brought to this country largely as a ballast, and the cost to land it is therefore about one-twentieth of the cost attached to transporting corundum from the mines to the same points in this country. This increased cost for the transportation of corundum is due largely to the fact that the mines are considerable distance from the lines of transportation, and even when delivered at the railroad the rail freight is more expensive than the ballast freight of sailing vessels.

The principal difference between emery and corundum wheels is that one is made of emery and the other of corundum, the bond, or cement, holding the grains together being practically the same in each. An emery wheel is made of such diameter and thickness as will best suit the work required of it. It is made of different degrees of hardness, some requiring a soft, some a medium and some a hard texture. It is also made of different sizes of emery, depending on whether or not the work is to be coarse or fine.

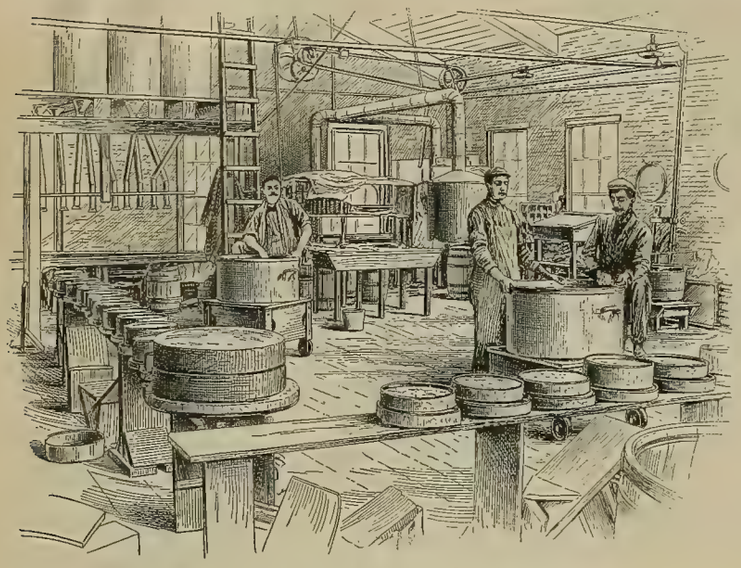


FIG. 1.—MIXING AND CASTING DEPARTMENT.



FIG. 2.—SHAVING DEPARTMENT.



FIG. 3.—KILN AND VITRIFYING DEPARTMENT.



FIG. 4.—TURNING AND TRUING ROOM.

The chief uses of emery and corundum wheels are to finish up and give a smooth surface to any iron, steel or metallic substance. Large quantities of them are used, as is well known, for gumming saws and grinding planer knives. In fact, they are sometimes called rotary files. One can readily understand that it would be practically impossible to name all the different purposes for which they are used. Their employment, however, can be summed up as follows: They are used for grinding, polishing, sharpening and shaping metal and wood substances. This does not cover all their uses, for wheels have been made for grinding feathers. They also do work similar to that required of the planer and lathe.

There are practically three classes of emery and corundum wheels—vitrified, silicate and chemical. Some users prefer one kind and some another. The vitrified wheel, of which there are the most in use, is burned in kilns, as shown in Fig. 3. The silicate comes next in quantity used. The difference between it and the vitrified consists principally in the difference in the bond used to hold the particles together, in that it is molded and tamped in molds, instead of being cast in just the sizes required, and then cooked or baked in ovens for a much shorter time and at not near as high a heat; also in that it can be made with or without a wire web. The Sterling Emery Wheel Manufacturing Company makes both the straight vitrified and silicate wheel, and also a semi-vitrified silicate wheel, which combines the best qualities of the other two. Referring to the illustrations of the principal departments of the plant of the Sterling Emery Wheel Manufacturing Company at Tiffin, O., Fig. 1 shows the mixing department, large tanks at the rear containing the different numbers of emery and corundum. A weighing appliance is underneath each, thus allowing the mixer to draw such sizes and quantity as are needed for the mixture. The wheels, after being mixed, are put in a dry room for one night. Fig. 2 shows the next process room, which is called the shaving department, where the vitrified wheels are shaved down to nearly the required size, leaving just enough allowance for contraction in burning. The wheels are then placed in a large dry room, where they remain until thoroughly dry before being placed in the kilns, one of which is shown in the next illustration. This engraving shows the kiln men placing the wheels in a kiln, where they are subjected to a heat of between 2500° and 8000° for about seventy-two hours, thus becoming thoroughly vitrified and one solid mass. The next process is shown in Fig. 4, where the wheels are turned up and trued to exact size, after which they are tested at a speed giving them a working strain of more than double that at which they should be run when in actual use. Besides this test, every wheel is tapped by an expert with a hammer the last thing before being packed for shipment, to make sure that no unsound wheel leaves the factory. Incidentally it should be mentioned that every emery wheel should always be tapped in this way just before it is placed on the machine for use, as it is not unusual that a wheel is so handled in transit that a latent crack is started and does not manifest itself until the wheel is in actual

use. John W. Bath, state inspector of workshops and factories in Ohio, states that, in his opinion, from investigations made by him, nine out of every ten emery wheels that burst are broken, or a crack started in them when the workman is putting the wheel on the arbor of the machine. This is the opinion of an unprejudiced party, and indicates that the user is at fault, and not the maker, for a very large majority of the broken wheels.

Fig. 5 shows the principal process in the manufacture of the Advance safety or silicate wheels made by the company. Here the men are at work tamping the mixture into molds. This, as will be readily understood, requires skill and experience on the part



FIG. 5.—MOLDING ROOM, OVENS IN THE REAR.

of the molder, as he must get the mixture in equally and in such a way that the wheel will be of the same hardness through and through, and hence run and cut uniformly. In the center of this wheel a wire web is put when so desired. After the wheel is molded to proper size, it is baked in the ovens shown at the rear of the cut. It is then taken to the turning department, Fig. 4, where it is trued up and tested by the same process as that of the vitrified wheel.

The wheels then pass to the shipping department. The works are so arranged that the raw materials come in at one end and proceed by regular stages to the other end, where the finished product is packed for shipment. A large stock of these wheels is kept by the San Francisco agents of the Sterling Emery Wheel Manufacturing Company, Parke & Lacy Co., 21 and 23 Fremont St., San Francisco.

Speed Government in Water-Power Plants.*

NUMBER IV.

MARK A. REPLOGLE.

Plate IV is intended to show the conditions of speed on a 2100-horse power plant when 1000-horse power of load is instantly added. The kinetic energy in the pipe at full load is 1000-horse power for one second. The power storage of the plant is 50,000-horse power for one second. Assuming that the speed of plant is at normal or zero line until it reaches vertical time line marked zero, where 1000-horse power of load is instantly thrown on. This being 2 per cent of the power storage, would cause a

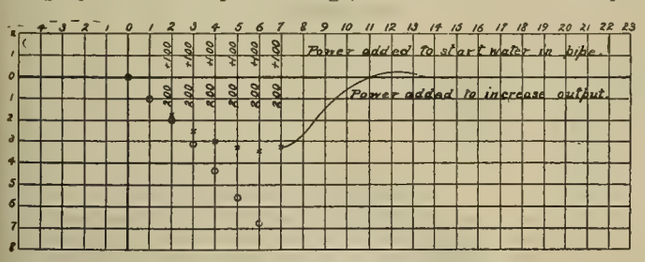


PLATE IV.

drop in speed of about 1 per cent during the first second after the change. If no power were added, the speed would drop a trifle more than 1 per cent during the second second, and continue to drop at an increasing ratio as the velocity of the revolving parts decreased. The curve indicated by the ciphers will show how the speed will drop during the following seconds if no new power were added to the wheel. Since it will require seven seconds to move the gates, the ratio of additional power supply will be 300-horse power per second, with a maximum action of the governor. Since the increase in load is 1000-horse power, and 500-horse power additional of kinetic energy must appear in the pipe, it will take the governor five seconds to add power enough to stop the speed dropping. Also, since the kinetic energy must be added to the flume in the same ratio that the new power is available, it is plain that only two-thirds of the 300-horse power added each second is available as additional power while the velocity of water in the pipe is being increased. Hence only 200-horse power is added as increased output for each of the following five seconds. This curve is indicated by the crosses at the ends of the several seconds. It can be readily understood that fully one second will elapse before any power supply can affect the speed of plant. It can also readily be seen that the power storage must carry the 1000-horse power new load for first second. While 200-horse power has been added during the second second, it has performed an average of 100-horse power work during this time. The power storage then has carried 900-horse power of the new load during the second second. Since the full 200-horse power is being added each second, the power storage is being gradually relieved of its drain and the speed stops dropping accordingly. A calculation at the end of each second shows exactly where the speed is at such time. Space will not admit the figures here, but the curve outlined by the crosses is approximately correct.

It is now evident that a formula can be deduced that can be relied upon in the government of water powers. It will be somewhat complex on account of the many factors that must necessarily enter into it. Many of these factors will necessarily be fixed by the conditions that attend the plant construction. The size of the power unit will always be decided upon first. Next will be the maximum change in load, with the greatest variation in speed permissible. The time of change in power supply is dependent upon the action of gravity and the safety of the plant. When the time required to supply power for the change of load has been learned, it is an easy matter to calculate the amount of stored energy or power storage that must exist in the plant in order to keep the variation of speed within the required limits. It will not be necessary to explain the fact that the speed will vary a fraction less in dropping off a load than it will in adding it.

In reducing the formula to its simplest form it will be necessary to combine or add together quantities that are of the same denominations, as follows: The time necessary to add power to overcome the increased friction in penstock, plus the time necessary to add power to overcome the inertia of the increased flow, plus the time necessary to add power for the new load, may be represented by T. The power necessary to equalize the increased friction, plus the power necessary to overcome the inertia in giving increased velocity to the supply, plus the power necessary to carry the increased load at speed, may be represented by L. The variation allowable in speed in terms that are a fractional part of normal speed may be represented by F, and the power storage may be represented by S. Since the power storage must carry the new load for one-half of T, and since the speed of plant varies in one-half of the ratio that the stored energy is given out or absorbed, it is evident that the formula must read:

$$\frac{T}{2}\,\frac{L}{F}=S$$

Further reduction makes it read

$$\frac{T}{4}\,\frac{L}{F}=S$$

The following example will make its use understood:

In the formula $\frac{T}{4}\,\frac{L}{F}=S$

Let $T = 4$ seconds.

$L = 1500$ H. P.

$F = 3$ per cent or $\frac{3}{100}$ variation in speed.

By substitution we have

$$4 \times 1500 = \frac{6000}{\frac{3}{100}} = \frac{12}{100}$$

$$= 50{,}000 \text{ H. P.} = \text{S.}$$

In the formula let T represent four seconds, L 1500-horse power, and F 3 per cent, or $\frac{3}{100}$ variation of speed allowable. In making substitution and reducing, the stored energy or power storage in the power unit must be 50,000-horse power. This is the amount necessary if 1500-horse power is to be added, and it requires four seconds to get the proper effect from the power supply, providing the variation in speed must not be over 3 per cent from normal.

(To be Continued.)

*Journal of the Franklin Institute.

Gold Mines in Siberia.

BY RUSSELL L. DUNN.

All the exploited gold mines of Siberia are placer mines. There are no quartz mines, though the placer gold for the most part came from quartz lodes that can be profitably mined. Among the miners there is no knowledge of gold mining outside of the placers and the old Siberian methods of mining them. It is quite probable that in the course of the placer mining there have been numerous valuable quartz lodes uncovered, but the ignorance of the miners has operated to prevent them from realizing them as the source of the placer gold, and they have been covered up by tailings and passed by. I saw several strong quartz veins exposed by outcrop, but had no opportunity to examine as to probable gold value. Near Vladivostok, on a small island, I saw some small quartz stringers carrying gold. There was no continuous vein, the stringers seeming seggregations in some of the bedding planes of the country rock. Though values were high the quantity of minable rock was insignificant. Lower down the hillside and extending down to the seashore were placers evidently derived from the erosion of these stringers.

The exploited Siberian gold placers are shallow deposits made by the existing drainage system. They compare most closely with the Klondike placers and with the gulch and ravine placers of California and Oregon. In the basin of the Lena river and in much of the Nertschinsk district of the upper Amoor river basin the placers are perpetually frozen ground, only the surface thawing 2 or 3 feet in the short summer. In the maritime province known as South Usuria, the region adjacent to Vladivostok, the placers thaw out clear to the bedrock every spring and summer, in fact some of them never freeze to the bedrock at all. In the Lena and in the northern Amoor region referred to there is very little opportunity to use hydraulic methods of any kind, though it is possible to modify the Siberian method used and to cut its cost in two. There fire is used to thaw out the ground in sinking the prospecting pits in winter, but no attempt is made to mine out the ground by drifting, except the barren overburden capping the pay gravel should be very deep or where it is impossible to drain in summer. Exceptionally there are placers that are mined by drifting, using fire to thaw out the frozen ground first, but the method is not general. The customary way is to first thoroughly prospect the ground by shafts, next to mark out on the surface the limits of the projected working and to remove the 2 or 3 feet of surface after the first winter frosts.

At the same time drains are dug around the plot to keep surface water in summer out of the pit. When summer comes the heat of the sun thaws out the exposed surface of the pit to a depth of 2 or 3 feet. This is removed in carts and a fresh surface exposed to the sun heat to be in turn thawed. In successive benches the overburden is removed down to the pay gravel. This latter is then taken out in benches down to the bedrock as fast as it thaws. It is taken in carts to the Siberian gold washing machine and the gold recovered in sluices. The tailings, instead of washing away, are carted off to deposit points separate from the overburden. The method is needlessly costly, but its economical features will stand transplanting to Alaska, where the physical conditions are similar. A very considerable economy can be secured in operating the Klondike placers if the same method of winter prospecting be followed, marking out the ground to be worked in summer. The sun heat for thawing is far cheaper than wood. There is no occasion, however, to use horses and carts to move the softened ground. Water can be made to do this work.

In the South Usuria region the placers, which seem to average in richness with those farther north, are much easier to work. For at least six months of the year there is no frost in the ground. Water is plentiful, and by easily constructed ditches can be had under pressure. While the dump and

natural grade of the placers is generally insufficient for hydraulicking, combinations of direct hydraulicking and the hydraulic elevator are generally practicable. There are as well localities particularly adapted to dredger work. This section I consider, for gold mining, preferable to the interior. The climatic conditions are similar to those of Canada, the country is accessible and most of the ground is as yet untouched by miners. Very little of it is in the hands of expert miners; most of the placers are owned by farmers and prospectors, who have neither the capital or experience with which to exploit their discoveries. Labor is cheap and abundant and less conservative than in the interior. It will take more kindly to the superior picks, shovels and mining tools generally of foreigners than will the labor of the interior.

The Russian mining regulations are liberal and admit of the entry of foreign capital into the business. They have one defect, however, in that they are made with reference to the Siberian method in use now. They are not elastic enough to admit the operation of our hydraulic methods without modification. It would probably be safest for foreign capital proposing to operate gold mines in the Vladivostok region of Siberia to first get the authority to introduce new methods by application to St. Petersburg.

Three New Battleships.

The Navy Department calls upon shipbuilders to prepare to build the three battleships authorized by the present session of Congress, with a limit of cost, excluding armament and armor, of $3,000,000 each. Heretofore the limit of cost was larger, as it included armor, the navy always building its own guns. The board has decided that the three new ships shall be almost identical with the Illinois, the Wisconsin and the Alabama, now building at Newport News, San Francisco and Philadelphia, respectively, and in all probability the new vessels will be built at those places, at the Cramps, at the Union Iron Works and Newport News. The call provides for vessels of 11,500 tons displacement, with a coal capacity of 1200 tons on a mean draught of 25 feet, a length of 368 feet and 72 feet beam. The hull will be of steel, with double bottoms and close water-tight divisions, with ample freeboard and berthing accommodations on decks above water. There will be no sails, but two auxiliary masts with fighting tops. Two lifeboats will be carried so as to be rapidly lowered in all conditions of weather.

The side armor belt will be 7½ feet broad and 16½ inches thick through the engine and boiler space, tapering to a thickness of 4 inches at the bow and stern, and there will be transverse armor forward and aft, 15 inches thick. Barbettes for the 13-inch guns will be 15 inches thick except in the rear, where they will be 10 inches. The turret armor will be 14 inches throughout. The ships' sides above the armor belt as far as the main deck will be protected by 5½-inch armor, behind which coal is to be carried for further security.

The vessels will have a protective deck throughout the entire length, 2¾ inches thick where flat and 3 inches forward and 5 inches aft where it is inclined. A cellulose vat will be fitted along the sides of the whole length. The conning tower will be 10 inches thick and there will be additional armored splinter bulkheads between the guns, and the small guns will have shield protection and extra side plating.

The vessels will be driven by twin screws, with two vertical triple-expansion four-cylinder engines, one on each shaft and in separate water-tight compartments. There will be eight cylindrical single-end boilers with a working pressure of 210 pounds in four separate water-tight compartments. The weight of the machinery is limited to 1130 tons.

These ships are to be completed, under heavy penalty, within two and a half years. After they are delivered to the Government their guns and other equipment will be installed. Their main battery will be composed of four 13-inch guns in two barbette turrets, one forward and the other aft, and ten 6-inch rapid-fire guns in broadside on the main deck, and four similar weapons on the upper deck with the superstructure. Two submerged tubes will be provided with eight 17-foot torpedoes.

Accommodations must be arranged for a complement of 600 officers and men. The turrets and ammunition hoists are to be operated by electricity. A speed of sixteen knots is required, with heavy penalties for any deficiency, and if the vessel fails to make fifteen knots she may be rejected altogether.

THE process of extracting copper from pyrites, in use near Antwerp, is described in a paper by L. Breda of Ghent. The ore, containing 3 to 4 per cent of copper, is roasted, crushed and roasted with salt. The chlorinated ore in quantities of twenty-five tons is twice washed with some 660 gallons of water; then with the waste liquor from the precipitating tanks, then with dilute warm sulphuric acid, and finally with warm water. The washed ore at last contains only 0.2 per cent of copper. The liquor is run into tanks, and the copper is precipitated by scrap iron. The remarkable statement is made that by this means the amount of copper left in the waste liquor does not exceed 1.4 gram per gallon.

Successful Treatment of Tailings by the Direct-Filling Process.*

F. C. PENGILLY.

For several years past metallurgists have tried, but so far with indifferent success, the treatment of tailings by what is known as the direct-filling process. In this process the vat that is filled with tailings from the battery is treated directly by cyanide, instead of the contents being discharged into another vat for treatment. In other words, the usual "intermediate" or "settling" vats are dispensed with. There are two mines on the Witwatersand gold fields where the successful treatment of tailings by the direct-filling process is now being carried on. These are the Jumpers Gold Mining Company and the New Kleinfontein Company, Limited.

The following is devoted to a short description of the plant and the method of treatment adopted at the latter mine during the past six months, a method that has been worked with considerable success and given exceedingly good results. The plant consists of two slime separators, nineteen treatment vats, four extraction boxes and nine solution tanks. The slime separators are of the ordinary spitzkasten or pointed-box style, 6 feet square at the top and 6 feet deep. Of the nineteen treatment vats, thirteen are of 200 tons capacity and six of 130 tons capacity each. Around the top of each vat is a launder, which carries away the overflow into the slimes race. The nine solution tanks have a total capacity of 636 tons of solution, and each is connected with the three centrifugal pumps worked from a motor that pumps the weak, medium or strong solutions on to the treatment vats. The pulp, or tailings, after leaving the battery plates, is lifted by means of a tailings wheel into a launder, by which it is conveyed to the slime separators. The slimes from the first separator pass into the second, whereby a quantity of fine sand is saved that otherwise would flow away. About 15 per cent of slimes is eliminated in the separators, and the remaining pulp is run through launders into the treatment vats, which are previously filled with water. In the course of filling the vat another 10 per cent of slimes overflows into the slimes race, so that the resulting tailings to be treated in the vat contain but a small proportion of slimes. The vat is filled with tailings (sand) to within 1 foot of the top, when the stream is diverted into another vat.

Method of Treatment.—Each vat, after being drained of water, is treated with an alkaline solution to neutralize the free acid in the tailings formed by the decomposition of pyritic ores. As soon as the solution draining away is slightly alkaline, the treatment by cyanide solution is commenced. Various strengths of solution are pumped into the vats, each vat receiving during the course of treatment from 200 to 275 tons of cyanide solution. The length of treatment is six days, and the amount of cyanide used is 0.6 lb per ton of tailings. This table is a page from the logbook of the New Kleinfontein Company's cyanide works, which shows the exact method of procedure adopted in the works in the treatment of a vat of tailings:

VAT I., CHARGE I.—CAPACITY, 207 TONS.

Date of filling.	Time.	Test.	Tons.	KCy Solution.
October.				
Wednesday, 6th.	1 P. M.	.....	Filling.....	....
do	2 A. M.	.....	Filled leaching dry.....	....
do	4 A. M.	Acid.	Alkaline wash, 20 lb, NAHO used, ditto half bag lime.	....
do	9 A. M.	Alkaline	Preliminary solution, 0.16; KCy, 20 tons.....	20
do	2 P. M.	.....	0.01 changed to weak box...	....
do	2 P. M.	.....	1st *strong*, 30 tons 0.3 KCy; 3 P. M., 20 tons; 7 P. M., 6 tons.....	56
do	9 P. M.	0.09	Standing under solution for 3 hours.....	....
do	12 P. M.	.....	Started leaching until 12 noon.....	....
Thursday, 7th.	1 A. M.	0.1	Changed to medium box. 3 A. M., 1.3; 6 A. M., 1.6; 9 A. M., 0.18	....
do	12 noon	0.2	Changed to strong precipitating box.....	....
do	12 noon	.....	2" *strong*, 30 tons; 0.3 KCy; 3 P. M., 10 tons; 6 P. M., 15 tons; 8 P. M., 1 ton.....	56
do	8 P. M.	0.28	Standing under solution for 3 hours. Started leaching until 8 A. M.....	....
Friday, 8th.	8 A. M.	0.26	*Medium*, 20 tons; 12 noon, 5 tons; 4 P. M., 8 tons; 8 P. M., 8 tons.....	37
do	9 P. M.	0.2	Changed to medium; 12 P. M., 8 tons; 5 A. M., 10 tons; 12 noon, 7 tons.....	25
Saturday, 9th.	3 P. M.	1.8	4 P. M., 10 tons; 8 P. M., 7 tons; 4 A. M., 12 tons; 8 A. M., 5 tons.....	34
Sunday, 10th.	6 P. M.	1.4	*Weak*, 5 tons; 12 P. M., 5 tons; 6 A. M., 5 tons; 12 noon, 5 tons.....	20
Monday, 11th.	6 A. M.	0.1	Changed over to weak.....	....
do	6 P. M.	0.9	5 tons; 12 P. M., 5 tons; 7 P. M., 5 tons; 12 P. M., 4 tons.....	19
Tuesday, 12th.	6 A. M.	.....	Leaching dry.....	....
Wednesday, 13th.	6 A. M.	.....	Discharging.....	....

Amount of KCy used, 5.9 lb. per ton.

Precipitation of Gold in the Extractor Boxes.—The precipitation of gold from the solution coming from the treatment vats is effected by the means of zinc shavings. A certain portion of the ore coming from the mine is of a rebellious nature, containing sufficient foreign metals to retard, if not prevent, the precipitation of gold by zinc. To counteract the effects of these foreign metals, it has been proved efficient in practice on these fields to set up a lead couple, and at these works this is effected by dipping the zinc shavings in a weak solution of acetate of lead, preparatory to being placed in the extractor boxes. In all cases it is found that zinc containing from 1 to 2 per cent of lead gives the most satisfactory precipitation. By the use of acetate of lead a perfect precipitation is brought about, only traces of gold remaining in the solution after passing through the extractor boxes.

The zinc shavings are first placed in the weak solution box, and afterwards transferred to the medium, and thence to the strong. In the weak and medium solution precipitating boxes the gold becomes plated on the zinc, and less zinc is destroyed than in the strong. The solution from the extractor boxes containing only traces of gold is returned to the solution tanks, where, if found necessary, its strength is made up by the addition of cyanide.

Cleanup and Reduction of Zinc Gold Precipitates.—The zinc is taken from the boxes at the semi-monthly cleanup and washed by hand in an oblong wooden box. The washings are then placed on a screen of 700-mesh, when all that will not pass the screen is replaced in the extraction boxes, together with the washed zinc. The product that passes the screens, consisting of gold in the state of a black slime and fine particles of zinc, is placed in a vat containing a filter bottom, consisting of American duck placed over a wooden grating. The space between the filter bed is connected with a 2-inch Cameron pump, by means of which the excess of moisture in the slimes is drawn off through the filter bed, the solution thus drawn off being passed into one of the extraction boxes to prevent loss of very fine particles.

The slimes freed from excess of water are taken out and placed in another vat having a capacity of about five tons. A 10 per cent solution of sulphuric acid is gradually added, the whole mass being continuously agitated by means of a mechanical agitator. The acid dissolves the zinc, and when the solution is accomplished and no more action takes place, the vat is filled with water, the agitator being kept stirring all the time. When the vat is full of water the agitator is withdrawn and the slimes allowed to settle for an hour. The water is then decanted off, the slimes taken out, dried and roasted in a furnace, care being taken that the slimes are not disturbed during the roasting so as to cause any loss. The dried slimes before acid treatment contain 4 per cent of gold; after treatment this percentage is increased to 33 or 45 per cent. The average fineness of bullion recovered is 847 gold and 60 silver, the base metals being principally copper and lead.

Of the pulp leaving the mill, 73 per cent is recovered and treated in the cyanide works, and an actual extraction of 80 per cent of gold is recovered from this, or 60 per cent of the gold leaving the plates. The advantages gained by the use of the "direct-filling process" are numerous, chief of which is the smaller plant required. The cost of erecting eight settling vats of 450 tons capacity each, including foundations, trucks, filter-beds and piping, would be £6,000.

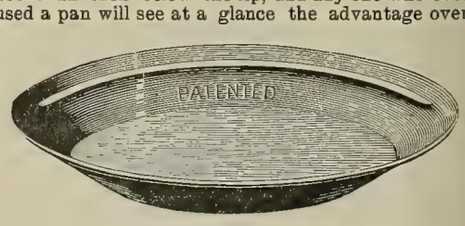
Interest on £6000, at 10 per cent	£ 600
Maintenance of settlers for twelve months, 10 per cent	600
Two extra shiftsmen in works, at £22 10 per month.	540
Discharging 192,000 tons of tailings, at 4d per ton...	3,200
Total.....	£4,940

This is equal to a profit of 6d per ton, or 2 per cent on the capital of the company, the actual working cost being 1s 11d per ton, including general charges and maintenance.

*New Zealand Mines Record.

New Improved Gold Pan.

Illustration is made of a new improved gold pan which is given considerable favorable mention by practical miners who have seen and used it. A flange or rim piece runs half way round the pan about an inch below the lip, and any one who ever used a pan will see at a glance the advantage over



NEW IMPROVED GOLD PAN.

the old style. Practical miners who have used it say that for panning both fine and coarse gold, headings containing coarse particles of amalgam and quicksilver, it gives satisfactory results, and the work can be done in half the time required by the ordinary plan. It is claimed that in the use of this pan it is impossible to lose the gold, owing to the flange or protector being placed inside of it. The pan is to be manufactured and sold by the Joshua Hendy Machine Co., 42 Front street, San Francisco, where a sample may be seen.

Electrolytic Refining of Lead.*

S. C. COLES.

Lead, when recovered from its ores by smelting, is obtained as a crude metal, the so-called work lead, which has to go through a refining process in order to obtain soft or market lead. Work lead is obtained either by roasting reactions, by reduction, by roasting and reduction, or by the precipitation process. Refining is effected either by oxidation after fusion or by electrolysis. Lead is never obtained pure when smelted from the ore. It is almost always alloyed with all the other metals contained in the ore itself. Apart from the fact that the useful properties of the metal are affected by these other metals, it is, of course, advisable for economic reasons to recover the precious metals present, such as silver.

One of the first processes worked on a commercial scale for the electrolytic refining of lead by electrolysis was that of Keith. In this process the crude or work lead is melted at the lowest possible temperature in iron kettles from which it is tapped into moulds. The anodes thus produced are fastened to metal rods by suitable clamps, and enclosed in close-fitting bags of coarse muslin. The electrolyzing cells are made of wood or iron; the cathodes are thin metal plates attached to rods in a similar manner to the cathodes. The electrolyte is composed of lead sulphate dissolved in an aqueous solution of acetate of sodium; it is made by electrolyzing with lead anodes a mixture of 1½ lbs. of acetate of sodium, 2¾ ounces of sulphuric acid, and 1 gallon of water, and is heated to 28° C. The sulphuric acid attacks and the acetate dissolves the lead, zinc and iron of the anodes. The zinc and iron, being electro-positive to lead in the liquid, are less easily reduced to metal and accumulate in the solution, and when dissolved in considerable quantity are, to some extent, deposited as oxide on the cathode, the current density employed being about 1.86 amperes per square foot. The lead which is deposited on the cathode is crystalline in form and separates continually from the plates, a space being left in the cells for its accumulation. When the anodes have been dissolved, the bags suspended from their supporting rods are carried to a reservoir and the residual solid matter from the plates is washed and returned to the melting kettles. The slimes suspended from the wash water are allowed to settle, the water is drained off, and the residue filtered. The slimes usually contain antimony, arsenic, silver, copper, gold and iron. A process that has been recently tried on a commercial scale is that of Tommasi. In this case, the electrolyte is the double acetate of lead and potassium (or sodium), the anodes are crude argentiferous lead, and two of these are opposed to a copper or aluminum alloy cathode, which is in the form of a disk rotating at the rate of from one to two revolutions per minute.

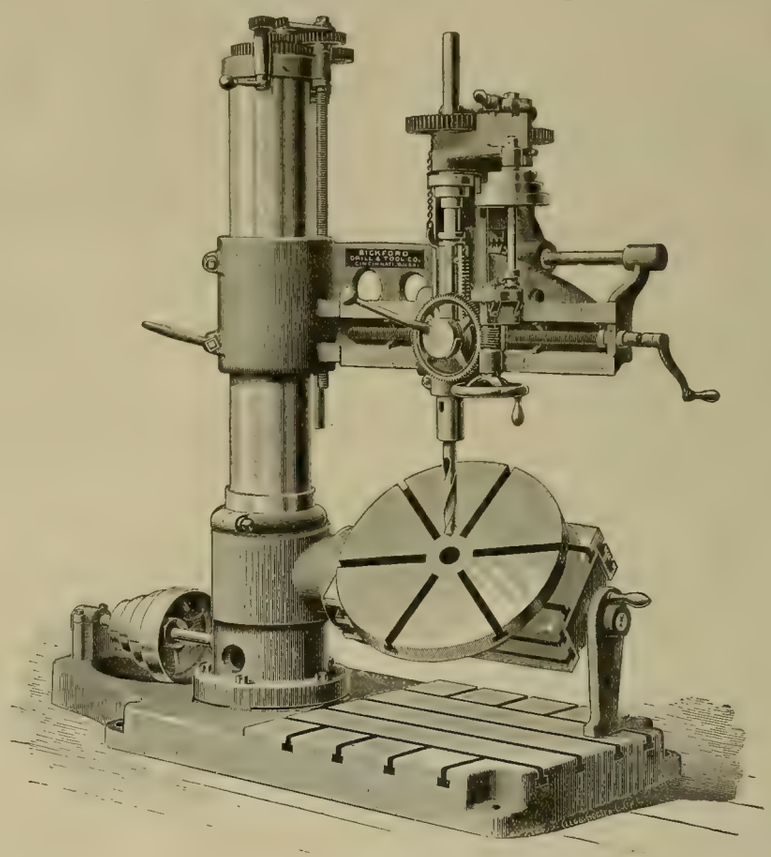
These disks are about 10 feet in diameter and three-quarters of an inch thick, and are half immersed in the liquid. At the upper part are scrapers which serve to detach the small spongy crystals of lead which form during electrolysis. The crystals when removed fall into channels which convey them to a sieve of wire gauze where they are drained and washed, the wash water being concentrated by evaporation to 20 Baume (sp. gr. 1.256) and used again in the electrolyte. The lead is then compressed and mixed with 2 or 3 per cent of charcoal powder and fused. The silver, with most of the arsenic and antimony, is separated at the anode, and is collected in trays to be fused subsequently with sodium nitrate and a little borax, by which the silver is separated from the arsenic and antimony. The cost is estimated by the inventor at from 8 to 10 francs per ton of lead when steam power is used. When lead acetate is used as an electrolyte, the resistance is found to be lowered, which is probably due to the prevention of lead peroxide deposits upon the anodes, which must be at the expense of the organic substance itself, which becomes slowly and surely oxidized. The products of the oxidation of acetic acid are carbonic acid gas and water, which are of no intrinsic value. This being the case the acetic acid becomes an expensive electrolyte as it has to be constantly renewed. The lead peroxide formed at the anode is reduced by a portion of the organic acid to oxide, which then dissolves in the acid and becomes finally reduced to metallic lead at the cathode. The impurities present in the crude metal and the oxides on the face of the anodes are usually bad conductors of electricity, and, if they do not become detached from the anodes, they form an insulating coat over a large portion of the anode surface. The natural consequence of this is, that the current passes mainly through those parts of the plate that remain freely exposed, and so the current density becomes greatly increased at those portions, with the result that the anode is rapidly riddled with holes. The addition of acid carbonic acid when mixed gradually with sulphuric acid and digested for some time at a temperature of from 50 to 100° C. easily converts it into insol sulphuric acid, which is soluble in water, and is capable of forming soluble salts with lead. These salts have been successfully used for the deposition of lead.

Maxwell Lyte has suggested converting the lead into chloride and electrolyzing it in the molten condition. Crude lead is fused and oxidized by a blast of air in a converter, the oxide is then stirred with hydrochloric acid in earthenware vessels until it is converted into chloride. Any silver compound associated with the lead, salt or oxide treated, is chloridized and is extracted from the mass by the application of strong hydrochloric acid or brine.

Electrical Review, London.

Half Universal Radial Drill.

Herewith is illustrated the Half Universal Radial drill, manufactured by the Bickford Drill and Tool Co., Cincinnati, Ohio. This machine is made in two sizes, called styles "A" and "D." In both the base plate is heavy and deep, ribbed and braced on the under side so as to avoid all spring. The column, with large, round base, is bolted to the bottom plate, and over this column, with long bearing on top and bottom, is fitted the outside sleeve which carries the arm. The sleeve rests on the bottom, on a large flange, and is fitted with three clamping bolts. The rotating arm fitted over the sleeve is of box form, strongly braced, and raises and lowers by power. The flange of the sleeve is provided with roller bearings which allow the arm to swing with perfect freedom. The machine is driven by a cone pulley, shown on the back of the drill, and by miter gears through the inside of the column to the top. All sizes are fitted with back gearing. The spindles have automatic feed and are fitted with the Bickford patent quick return motion. The box table and the countershaft complete are furnished with each machine. The shafts, spindles, worm, worm rings and the main gearing are made of steel. All gearing is cut from the solid. The head of these machines may be swiveled at any angle upon the arm. The makers also manufacture full universal radial drills in which the head rotates and the arm revolves around its own axis, thereby making it possible to drill at any angle and in any direction within the range of the arm. The style "A" machine will drill to the center of a 10-foot circle and will receive 4 feet 10 inches over base. It weighs 6500 pounds. The style "D" machine will drill to the center of a 11-foot circle and will receive 6 feet 8 inches over base. It weighs 12,000 pounds. Full details in regard to these tools can be had from the Bickford local representatives—Messrs. Henshaw, Bulkley & Co., San Francisco.



HALF UNIVERSAL DRILL.

REGARDING the theory that gold nuggets are formed by the depositing of the gold around a nucleus from solution, A. Liversedge of New South Wales has made investigations which he thinks disprove it. By slicing the nugget and examining the cross sections obtained he found no traces of concentric coatings, but that the gold was always more or less crystallized, the crystals being in some cases very large and with well defined boundaries. Some of the nuggets also showed cavities and inclosures of quartz, although in many cases none were visible on the rolled surface of the nugget.

The State Mining Bureau.

TO THE EDITOR:—Is the State Mining Bureau dead or only sleeping? Very little is heard of what a short time since was the most practical and efficient of all the State Bureaus. The absolute reversal of the practice followed in the conduct of the Bureau under the predecessors of the present incumbent of the office of State Mineralogist has destroyed the efficiency of the Bureau. Aside from this, the change made by the present State Mineralogist is in direct contravention of the law under which the appropriation for the support of the Bureau was made by the Legislature. Under the law one-half of the appropriation must be expended in field work. As a matter of fact none of it is being so expended. The alleged mapping of the mines is not field work but office work. It is doubtfully Mining Bureau work, and certainly of no practical use whatever to a miner or to the advancement of the mining industry. So far is it from complying with the spirit of the law and the object of the Bureau organization that it is questionable whether the miners acting through some of their organizations should not enjoin the State Mineralogist from expending the appropriation for such purposes. The Bureau has been highly beneficial to the mining industry of this State and the world at large. So sought after have been the Reports that they command prices unheard of hitherto in the distribution of official reports generally.

Many of the papers prepared by specialists are in strong demand, though long out of print. Of some, second editions have been printed and distributed. All of this class of valuable work has been abandoned and worthless map compilation substituted for it. To what end these changes have been made is not apparent. The effect of them in creating a feeling that the Bureau, as at present managed, is useless, either dead or sleeping, is quite apparent.

MINER.

San Francisco, June 1st, '98.

IT has now been some time since anything new has been reported in the line of producing iron from beach sands. This week a Chicago inventor brings to notice a "metallic ore separator." The machine is of box form, has its front covered with brass plates, behind which are three electric magnets, one above the other and 22 inches apart, the end of the magnets coming in contact with the brass plates and magnetizing them at the point of contact. The sand falls in a stream in front of the brass plates and as it does so the particles of iron ore are drawn out, adhering to the plates, where they, too, are magnetized. The upper magnet catches the greater portion of the ore, the last particles remaining in the sand being caught by the lower magnet. A commutator breaks the current at intervals, thus demagnetizing the plates and allowing the accumulated ore to drop into hoppers, from which it is conveyed out of the separator.

Some Metallurgical Methods.*

NUMBER III.

The cost of smelting at Broken Hill, Australia, says Mr. Blakemore, varies from half year to half year, but on the whole has steadily decreased, until at present it costs about 25s a ton, including costs for superintendence, labor, repairs, water, fluxes, fuel, light, etc. In 1888 the cost of smelting amounted to 36s 6d per ton, with the pick of the ore to smelt. The costs given do not, of course, cover desilverization expenses, insurance, carriage on bullion, etc., but are simply the actual expenses incurred on a ton of ore in the blast furnace department from the time the ore is received from the mine until the bullion is made and put in the railway trucks ready to be despatched for further treatment. The lowest smelting cost per ton of ore was at the British furnaces on Proprietary ore from the 1st of June, 1894, to the 13th of September, 1894. The quantities of ore smelted were as follows: Carbonate lead ore, 4358 tons net; silicious iron and kaolin, 16,395 tons; manganic iron ore, 5279 tons; sulphide ore, 53 tons; total, 26,085 tons net. Coke used, 3801 tons, or 14.57 per cent on the ore; limestone used, 2452 tons; coal used, 59 tons; firewood equal to coal, 774 tons.

The total cost of everything, including rent of furnaces, water, coke, flux, coal, firewood, repairs, stores, light, salaries, assay expenses, and labor about the furnaces was £24,214 1s 11d, or 18s 6¾d a ton on the net ore. Manganic iron ore was good and plentiful, and therefore no ironstone had to be purchased, which, of course, materially helped towards the low cost of smelting.

Smelting Losses.—In the absence of any reliable method of sampling the ore the exact contents were never really known. "Grab samples" were the only means used to arrive at its value, taken from each mine truck as it reached the surface, and at the furnaces a man was kept on each shift to sample the ore as it was smelted. It was the crudest method of sampling possible, and naturally the results were just as crude and useless. Had accurate means of sampling obtained it would have been a great check on the furnaces, and given the general manager a lever—which he never possessed—on the whole metallurgical department. Certainly it would have saved many thousands of pounds yearly. Accurate assays were made out on the basis of the assays which were obtained from the samples, every little item being brought into account each week to the last fraction of a penny to get at the cost per ton of ore treated. These latter were correct enough, but the statement of the recovery of silver and lead was not worth the paper it was written on, inasmuch as the basis of the whole thing, the assay of ore, was the result of incorrect sampling. The samples were just as likely to show a greater value in the ore than it contained, or vice versa. Hence you would see that for one week the total extraction of lead was 70 per cent, silver 120 per cent. The next week the figures would show a recovery of lead 47 per cent, silver 65 per cent. These discrepancies can only be attributed to the incorrect method of sampling. Apparently more silver was recovered in the first instance than was in the ore, showing immediately the valuelessness of the whole return. A reliable statement of the extraction of silver and lead from Broken Hill furnaces generally is not to be obtained, but my opinion is that about 90 to 92 per cent of the silver and 65 to 70 per cent of the lead actually in the ore were recovered in marketable products. The loss in slag was great, because the proportion of slag made to ore smelted was from 1¼ to 1½ to 1, due to the silicious character of the ore. If the slags averaged 4 per cent of lead, which is within the mark, we get a loss on the ore; if it averages 15 per cent of lead in later days, of 5 to 6 units of the 15 in the ore, equal in the lowest slag output to exactly 25 per cent of the total lead put into the furnaces being lost. Other losses of lead take place in fumes and escaping flue dust, but are not so extensive as has been assumed. The flue dust recovered to from 0.80 per cent to 1½ per cent on the weight of ore charged into the furnace.

The following determinations give some idea of its principal constituents:

FLUE DUST.

Lead, per cent	25	37	23	30	30
Silver, oz.	20	24	30	21	21
Zinc, per cent	11	13	10.8	10.7	10

The usual method adopted with this material is to moisten it with water and return it to the furnace. Necessarily a great percentage of it rapidly dries and is carried out of the furnace by the strength of the blast back into the flues.

No particular effort has been made to make a better collection of the flue dust, the flues being designed simply to carry off the smoke and fumes, and accordingly the lighter particles of dust (and these are always rich in lead) are carried off by the force of the draught into the stack and fall outside on the surrounding land. Plenty of ore of good value has always enabled the company to pay good dividends, and the loss arising from escaping flue dust has not been felt.

The refinery is at Port Pirie, in South Australia, on the sea coast. The spot was chosen as being about the most convenient place having a water traffic for the largest ships, in the center of a good flux district, and with its sea advantages coal, coke and stores were landed at a price very considerably below the cost in Broken Hill. The last year or so the company have found it to their advantage to refine the whole of their output of lead, due to the extortionate charges and deductions made by English refiners. The plant is capable of handling some 800 tons of silver-lead bullion weekly, and is very complete in detail. It was designed by Mr. H. H. Schlapp.

The silver-lead bullion is first put into reverberatory furnaces, where it is melted down slowly, so that much of the impurities which it contains may be taken out at the commencement. This impurity or dross, as it is styled, consists almost entirely of an alloy of copper and lead with silver, one part of copper taking up sixteen or seventeen parts of lead. When the lead is all melted down the layer of dross skimmed off clean. The heat is then raised and by degress the small percentage of antimony, copper, iron, sulphur, etc., are skimmed off, leaving in the furnace a soft, easily marked lead and silver bullion. This operation takes some sixteen hours or more to finish. From the furnace it is tapped into cast steel or iron kettles of a capacity equal to that of the furnace. By the aid of a fire under the kettle the lead is made hot, and a small percentage of metallic zinc, from about ½ per cent by weight downwards, is added. This is well stirred in for some half hour or longer, and then the contents of the kettle are allowed to cool down considerably. As soon as the temperature falls below a certain point the zinc, which has alloyed with the bulk of the gold present, some silver and lead begin to separate out, exactly as cream rises on a dish of milk, and is skimmed off and kept for further treatment. The remaining lead and silver are then heated up to the melting point of zinc once more, and about 1½ per cent of zinc added. The cooling process is repeated, and the zinc-silver-lead crust once again skimmed off. This skimming or crust, known as the silver crust, in contra-distinction to the first one, called the gold crust, is kept apart from the latter. The zincing operation may have to be repeated once or twice before the lead is desilverized; usually half an ounce left is considered low enough. It is then syphoned off into a lower kettle by means of a Steitz siphon, made of ordinary 1½ or 2-inch black iron pipe. This lower kettle has a movable hood, and as soon as the temperature of the lead has been raised sufficiently dry steam is forced into the lead to oxidize the zinc which has remained in from the preceding operation of zincing, and also to remove the last traces of impurities. When the lead which contains the zinc is heated to redness it has the power of decomposing the steam, the zinc and some of the lead seizing on the oxygen of the steam to form oxides of their metals. These oxides gather on the surface of the lead and are skimmed off occasionally. Samples of the lead are taken from time to time, and the purity of the lead is judged from its color, and the ease with which it can be marked. Good soft lead is easily marked with the finger nail. As soon as it is decided that the lead is purified it is skimmed quite clean with wooden rakes, and then allowed to cool considerably, so that when it is cast into moulds it will set even and be of a silvery white color. Moulded at a greater temperature a bluish appearance is assumed by the lead, due probably to a film of oxide forming. When cool enough it is siphoned off into moulds, and then is ready for sale in the market as best refined lead. The Proprietary refined lead is remarkably good, and commands as good, if not a better, price than the English refined lead. This is due in a great degree to the small amount of impurity which the original bullion contained, and, secondly, to the care evidenced throughout the refining process.

We have now to deal with the dross, which was obtained at the commencement of the process. This is either sent direct to the blast furnaces to be smelted up with the charge, or else is put into the liquating or sweating furnaces, where it is heated gently to expel any metallic lead which has clung to the actual dross. This lead is run out of the furnace into an outside kettle, separately fired, to keep the lead obtained in a molten state; and when enough has gathered it is moulded into bars and returned with the next charge to the softening furnace. The dry liquated dross is then smelted in the blast furnaces with the ordinary ore charge. The zinc-silver-lead crusts obtained from the second zincing of the softened lead in the kettle are also liquated to free them from any lead which they may have gathered, and the lead liquated out is returned to the zincing kettle. The dry product left behind is put into graphite and clay retorts with a percentage of carbon, and highly heated. The zinc distills off, and some 50 or 60 per cent of it is recovered in metallic form in the retort condenser, the balance being recovered as an oxide known as "blue powder," some being lost in fume. As soon as the retorting operation is finished, which takes twelve to fifteen hours, the zinc condenser is removed, and the rich silver-lead bullion of some 5000 ounces to the ton is ladled out into moulds. The style of furnace is a modification of the Tatham retort furnace, and is not so handy as the Du Faur tilting retort furnace, which pours out the lead instead of having it ladled out. The retort is thoroughly cleaned, care being used because the heat has softened it considerably, and after cleaning some carbon in the form of charcoal is thrown in to keep the little lead left in the retort from forming litharge, which would rapidly destroy the retort. The latter is then ready for a fresh charge of the zinc-silver-lead crust. A retort lasts from twelve to thirty charges, and then is replaced by a new one. The rich lead bullion obtained from the retort is then taken to the refining or cupelling furnace. Here it is melted in a test or cupel (made of fireclay), cement and ground limestone being allowed four or five weeks to dry before being used, and as soon as the lead is hot enough an air-blast is turned on to the face of the bright red lead, and the operation of refining for silver commences. The action of the air is to oxidize the metallic lead into litharge, and this flows off in a stream more or less high with silver. As the level of the charge falls, fresh bullion is fed in through a small hole, but when the charge is almost pure silver, and the cupel quite full, this is stopped. At the finishing part of the cupellation the most beautiful irridescent colors traverse the face of the silver, due to the last traces of lead passing off. The temperature of the furnace has to be kept very high to keep the mass of silver molten. As the last signs of lead disappear the process is finished. The molten silver is then ladled into molds, and finally refined in large crucibles with nitrate of soda or potash, from whence it is poured into molds holding about 1000 ounces of fine silver each. The grade of the silver is about 996 fine; the remaining four parts usually consist of copper, with the very smallest trace of lead. The gold-silver-lead-zinc crust got in the first operation of zincing in the first kettle goes through exactly the same process as does the second crust just described. After it is made into bars it is, however, further treated for the separation of the gold and silver. The bars of this Dore silver, as it is called, are put into a cast-iron kettle, heated by a fire, filled with strong sulphuric acid, preferably of about 66 Baume. This is boiled until complete solution of the silver takes place, the gold being left as a dense black, finely divided powder at the bottom of the kettle. The solution containing the silver is either ladled or siphoned out of the dissolving kettle into a settling tank warmed by steam passing through a leaden coil. Here any fine particles of gold which may not have settled in the dissolving kettle are collected. The silver solution is diluted to about 24 Baume, and emptied into a precipitation vat, in which plates of copper are arranged. The reaction between the metallic copper and the silver sulphate solution causes the silver to precipitate and the copper to go into solution as a sulphate, so replacing the silver. The liquor left in the vat after the silver is all out is siphoned into vats, where the copper sulphate is crystallized out. The silver precipitated on the copper plates is then taken to a vat and well washed in hot water to free it from the last trace of sulphate of copper. It is then melted up and sold as fine silver and is about 997 fine.

The gold is sometimes pure enough to melt up into bars; but if not, it is boiled with fresh acid, then thoroughly washed, dried and melted. Since this method has been adopted, the Moebius electrolytic separation of gold and silver has come into prominence in America, and some writers claim for this process that the cost of separation does not exceed one-eighth of a halfpenny per ounce.

Chloridizing and Lixiviation.—The ore which is handled in these portions of the works is too low grade to pay the expense of blast furnace treatment, and it has to be mined to get at the other and richer ores; so there is a choice of two things, either use it for filling the stopes or treat it at a small profit. To get this small profit the chloridizing and lixiviation works have been erected. The first part of this plant consists of the necessity of crushing and power machinery for reducing the ore to the required state of fineness. Salt is added during the crushing operations from 4½ to 6½ per cent by weight. The mixture of crushed ore and salt is elevated into hoppers, from which the ore is automatically fed into a series of eight Howell revolving cylinder furnaces, which chloridize from thirty to forty tons of ore per furnace daily. All of the furnaces are not in constant work, some always being kept as stand-by furnaces, ready for use at any time.

The quantity of ore treated weekly averages from 1400 to 1500 tons, at a cost for all expenses, such as superintendence, coal, labor, salt, repairs, assay expenses, water, light, stores, etc., of 12s to 13s a ton on the gross ore crushed. The following analysis of the chloridized ore may be of interest:

	1.	2.
Silica	78.40%	78.00%
Pb Cl	3.76	5.37
Ag Cl	.042	.044
Na Cl	2.48	2.60
Fe_2O_3	8.62	9.00
Al_2O_3	0.14	0.15
MnO_3	5.07	2.55
ZnO	1.25	2.18
		Trace of antimony.
	99.762	99.894

(*To be Continued.*)

Condensed.

Mining Summary.

CALIFORNIA.

Amador.

The shaft of the Amelia mine has reached a depth of 610 feet.——At the Central Eureka 135 feet was sunk in one month, at a cost of not less than $8.50 a foot.——At the Mason & Griesbach about 200 tons of good prospecting ore is on the dump and will be crushed at the Gracey mill.——At the Oneida drifting is in progress. Some good rock was found. A mill will be erected on this property this summer. ——The mill at the Red Hill mine closed after a run of about forty-eight hours. Circumstances were unfavorable for a continuation and the owner shut down. The mill passed, with the mine, into other hands June 1st.—— The owners of the Ironbound have bonded the old Soracco mine and are now running a crosscut about 400 feet in length, and will drain the shaft; prospects are favorable.——The Argonaut has a cash surplus of over $80,000 in bank, together with over $20,000 worth of rock on the dump and $10,000 worth of sulphurets on hand, making their surplus over $100,000. The mine started its mill only six months ago.——W. F. Detert, Supt. Zella mine, says that the Zella will probably discontinue present operations about July 1st next and begin sinking in the old shaft, which is to be sunk 200 feet deeper.——Whitehead & Bradshaw will soon commence hydraulicking on their claim.——Supt. Lyle closed the Fogus mine down last Friday and went to San Francisco.

The Amador *Republican* learns that work on the Alma mine will be commenced, after the annual meeting in July, under new management.——The South Eureka is now in the dividend-paying list. A larger mill is contemplated.——At the Wildman-Mahoney work on the new shaft is progressing, having reached a depth of 235 feet.—— Mrs. Hepburn is negotiating with Chicago parties for an early resumption of operations on the Bellwether mine.

Ledger: Gen. Mgr. J. E. Dye of the Jackson Exploration Co. started ten stamps of the 60-stamp mill this week.——W. Nevills Jr. states that he will soon reopen the Moore mine.——The contractors sinking the South Eureka shaft at Sutter Creek, 270 feet from the 1250-foot level, are completing their contract. The South Eureka is operating twenty light stamps. Besides the development work done, this company has accumulated some money, with which two dividends of $6000 each have been paid.

Butte.

The Butte Creek Gravel M. Co. near Adams continues hydraulicking under favorable circumstances.——The Denver mine is said to have struck an 8-foot ledge that is high grade and thirty men are employed. The tunnel is in about 1000 feet and the ledge has been tapped 400 feet below the surface. The 10-stamp mill is running regularly and the quartz is paying well. The company, H. H. Noble and J. Floyd, the former of San Francisco and the latter of Nevada City, intend putting up chlorination works during the present season. Extensive developments have been made on the ledge, so that it is known to be permanent.——The Bank of England Con. gold mine, comprising thirteen claims, is being developed under C. C. Antrim.——The Murray mine near Enterprise resumed work after a short shut down.

In the Gold Bank mine about 130 men are employed and everything is looking well. H. P. Stow, it is locally stated, contemplates putting in a large electric plant for the use of the mine and the people of Forbestown.

Calaveras.

Citizen: Gibson & Manley at West Point are running their 4-stamp mill night and day and are meeting with satisfactory results.—— P. C. Musgrave is doing good work at the Harrison mine; the 5-stamp mill is running night and day on good ore.——The Champion Co. is busy pumping out the old works.——The Keltz is taking out high-grade ore for shipment.—— Good ore is being extracted from the Machu mine, and the 10-stamp mill is running night and day. The ore is hauled two miles to mill. ——The Stella mine, on the South Fork, has suspended operations.——The Blizzard mine has been bonded to M. Armstrong of Los Angeles, who will develop it.——The Bear Mountain Co. is constructing an electric power plant on the Stanislaus river to transmit power to the mine and mill at Bear Mountain.

El Dorado.

Development work continues with success at the old Mt. Pleasant mine, near Grizzly Flat, which had been abandoned for several years.——At the Eagle mine the working force has been increased.——In the Crossman mine at Rescue the ledge, situated between quartz and slate, measures from 40 to 100 feet of mineralized quartz. The work on this mine is pushing ahead, and Supt. J. J. Crossman states that the company he represents will sink the shaft to a depth of 300 feet before erecting their quartz mill, although at present the quartz assays on an average $6 per ton, and if it will hold out to the level above mentioned the company will erect a 100-stamp mill without delay.——For the first time in the history of Kelsey three mills are in operation, the Gopher-Boulder, Big Sandy and the Sunrise.——At Grizzly Flat work continues in reopening the old Mt. Hope and Flagstaff mines.——It is said that the Hoskins property, comprising the Eagle and Grouse Gulch claims, on both of which considerable work has been done, have been bonded to a Scotch company, and that work is to be pushed.

Richardson & Koepfer, at Granite Hill, have taken out considerable ore, which they are hauling to a custom mill for a test crushing.

Inyo.

C. A. Weaver's mill at Ballarat is running night and day on ore from mines in the vicinity. Enough is stacked up at the mill from different mines to run a month.

The *Register* says that encouraging developments are made at the Molus mine, near Bishop, and the mill on that mine will shortly be in operation.——A mill is being erected on the Smith & Co. mine and will soon begin crushing.

Kern.

The *Rand* says that F. Fleming, while dry washing near Johannesburg, found a nugget that weighs $315.——The Butte mine employs fourteen men and is using five stamps continuously at the Red Dog mill.——The Sunrise and other low-grade ore mines at Johannesburg will ship ore to the Barstow mill.—— Work will not begin on the Alameda and Jolly Girls mines until October, when extensive development will be carried out.——The shaft on the Hector is nearing 200 feet.—— The 8-stamp mill at the Little Butte mine at Randsburg began operations. It is expected that $3 ore can be handled with profit.

Randsburg *Miner*: In the Butterfly mine at Rademacher at a depth of 40 feet a ledge has been opened 13 feet in width, carrying ore which will mill from $60 to $500 per ton.——H. Hirshfeld is developing several claims. T. A. Hall is Supt.——The Rademacher mine continues producing good ore.

Mono.

In the Standard Con. mine of Bodie for the week ending May 21st the regular prospecting work continued to be done on the 150, 200, 318, 470 and 582 levels in the New, Security, Moyle, Bullion, East, Station, Main, Standard, Black and Fortuna ledges. There is no change in the condition of the mine, which is looking well. The usual amount of fair to good ore was extracted during the week.

Standard mill statement: Ore crushed for the week, 291½ tons; average assay vanner tailings, $7.66; concentrates produced, 8¾ tons; assay value, $140.90; amalgam produced, 1427 troy ounces; value per ounce, $1.89. Tailings plant No. 1 worked 527½ tons tailings; No. 2 worked 355½ tons tailings.

Nevada.

(Special Correspondence).—The new shaft at the Homeward Bound mine of the Omaha Con. G. M. Co.'s property, near Grass Valley, has reached 1100 feet. The company has put in electric power at the new shaft to operate the pump and hoist. It will operate direct; there will be two motors, one on each side of the shaft, of 100 H. P. combined. At Nevada City the pipe line for the Champion mine has been completed, and the 40-stamp mill which was closed pending the construction of the pipe line, made necessary by the breaking of the dam at the reservoir, is again in operation. The temporary close of the company's larger mill explains the passing last month of the usual dividend. At North Columbia grading is in progress for the new mill of the St. Gothard Con. M. Co. It is said the new mill, to begin with, will have twenty stamps, which will be enlarged if results warrant. The ore body is large, but so far as developed is low grade. The electric power plant at the Brunswick, near Grass Valley, is completed and a test run proves satisfactory.

Nevada City, June 1st, '98.

The Red Dog mine at You Bet is making its last cleanup for the season. Lack of water compels the company to close work for the summer.——The Bellefountain at Nevada City is sinking from the 330 level.——The *Transcript* says that work on the new bedrock tunnel at the North Bloomfield mine is progressing. When the 800 feet of tunnel is completed the channel will be worked by the drifting process. Miners will then be put on as fast as room can be made for them, and it is expected that by next fall close to 150 men will be employed.

Transcript: The 40-stamp mill of the Empire mine of Grass Valley is being remodeled, and will be completed in six weeks; it will be one of the best arranged mills in the county. The concentrators are to be reset, and a drying room for the concentrates is being fitted up. Two dams have been built to impound the best of the tailings.

Placer.

The Gold Slide M. Co. began work on its property near Auburn. G. Huber is Supt.

Plumas.

F. Scott is taking out pay at his mine near Quincy.—— A number of men have begun mining on Chips creek.——The company working the Green Mountain mine under bond at Crescent Mills have surrendered the property to the owner.——The *Bulletin* says that a large channel of good gravel has been tapped in the Topaz-Centennial mine near Spanish Ranch.

Plumas *Independent*: A company is preparing to flume the Middle Fork of Feather river in the neighborhood of Bell's Bar. The location was flumed many years ago, though a comparatively small portion of it was worked, owing to the peculiar contour of the bedrock, which is as high at the lower end of the claim as it is at the upper end, dipping slightly as the work progressed, but sufficiently to prevent the proper drainage of the claim and thorough cleaning of the bedrock. The gold obtained for the season's work was sufficient to create a belief that a fortune awaited those who might be so skillful as to drain the ground. The present season is favorable to the work.——A bar farther down the river is being worked by men who are getting satisfactory returns for their labor.——At Rocky Bar fairly good pay has been struck.——At Rich Bar Wilson & Eaton are reported to have struck a good claim.——Minerva Bar will be opened up by eighteen men from San Francisco who are now on the ground. Residents of Nelson Point and Sawpit also are interested in the enterprise.——While it is not expected the output of gold from Plumas will equal that of last year, much of this year's gold crop will be gathered from placers where, but for the present low stage of water in our streams, it would have remained hidden forever.

Riverside.

In the Leon mine, near Perris, considerable development work has been done and there is a large ore dump that is said to mill from $8 to $12 per ton.

San Luis Obispo.

It is stated that by a process for burning and volatilizing the ore five men working quicksilver properties near Paso Robles are clearing $60 per day.

Shasta.

Near Stella there is considerable prospecting and mining going on, both in quartz and placer. The Desmond Bros. will erect a 5-stamp mill on their property. They have good ore and their claims are well opened.——The Manlove property has been worked since March by a crosscut tunnel, which is in 116 feet.——The copper deposits located by J. Davis have considerable development work done and a large body of ore has been exposed.——The Condon & Enos property, has a ledge from 4 to 5 feet in width that carries gold and is well opened.——McGinis & Co. will resume work in the near future.——Davis & Bishop are at work on a large sulphuret deposit carrying some free gold.

McLean & Co. have begun work on the Simonds property near Churntown, which had been abandoned several years. In a 50-foot drift they found a 6-foot ledge that yields good assay values.——W. Kemp is sinking three shafts on a copper property in Lewishon Camp.—— The National mine last week shipped 25,000 pounds of sulphurets.——M. Ware has six men at work near Keswick taking out ore, which he sells to the smelter.—— The 5-stamp mill on the Boyd mine, near Fort Dingee, is running on ore said to go at least $60 to the ton.

The output of the Mountain Copper mine has been increased to supply the smelting capacity. Power drills are being placed on the Hornet claim on the opposite side of the mountain from the present works, which has developed into a large body of ore. Two tunnels have been run 600 feet. The ore body has been crosscut, showing a width of 75 feet. ——The big smelters at Keswick are in full operation. Ground is being prepared, extending the roasting surface.——The new matte furnace has completed a successful run. This resmelting of the matte increases the percentage of value and reduces the freight charges to the refineries.

The pumping and hoisting plant at the Gladstone mine near French Gulch is almost ready. The machinery is operated by compressed air.

Sierra.

The Upper Dutch mine, near La Porte, got through with the season's work and, though the conditions for mining have been unfavorable this year, it is believed the company is satisfied with the cleanup.——The Claybank resumed operations in running the main tunnel ahead.——There are ten men employed at the Mountain mine at Sierra City, and in a short time, Supt. Pinney says, fifty more will be put on.

Siskiyou.

The Siskiyou mine near Fort Jones shipped over $4500. Piping will be suspended for the present and the mine put in shape for the next season's run.——L. A. McIntosh has purchased the interest of S. Clary in the California Queen mine, Cottonwood district. There is a 5-stamp mill on the property which will be increased to ten stamps. If the water becomes short, steam will supply power. A twenty-pound gold brick was brought in from this mill last week.——A land-dredging proposition is being contemplated by mining men on the Klamath river, near Oak Bar, on the Pine Grove placer mine, comprising eighty acres of gravel. The plan is to flood the land from the Klamath river, and work the gravel to bedrock with a dredger, an average distance of 14 feet. The gravel has been prospected and gold is distributed in paying quantities. The land is one and one-fourth miles in length.

The company represented by O. Howard, of San Francisco, who has made a deal for the old North Star quartz ledge on Humbug, has paid most of the purchase money with intention of working the ledge on an extensive scale.

The Greenhorn Blue Gravel Co. has struck a rich back channel, which is paying well, and there is also a good supply of bedrock water for the sluices.

Brown & Reeder, who were in Yreka a week ago with over $2100 from a week's run of their mill at Shasta river in Fool's Paradise district, have taken out $1800 more in a day and a half's run.——F. Lemay, on the old Hagedorn & Wademan ledge on Greenhorn, pounded out twenty-six ounces of gold and crushed five tons in which the gold realized $118. He is still taking out good quartz, with ledge varying from 16 to 18 inches.

Trinity.

Hutchins & Searles at Hay Fork are running a tunnel on the Goodenough mine.—— Johnson & Boswell at Hall City have run in a tunnel 250 feet.——Wilson & Brown have a good ledge of fair value.——D. T. Curtis of Oakland has bought a two-thirds interest in the Rattlesnake group of quartz mines near Weaverville. Men have been put to work on the property and it will be thoroughly developed. Mr. McLisle has charge of operations.——The Kindred & Burgess mine at Mad River has been reorganized under the name of Little Klondike. The dry season will give them a good opportunity to mine the low river bar that prospects encouragingly.

Tuolumne.

The shaft in the Rappahannock is over 1100 feet deep. The superintendent will sink to the 1100 before drifting or crosscutting for the lode.——In the Alameda Supt. MacDonald has resumed sinking below the 600-foot and will continue to the 1000-foot mark. Drifts north and south 50 feet each way have been opened showing a good ore body.——At the Monte Cristo the shaft has reached 100 feet. ——The Tarantula Co.'s shaft is 350 feet and good rock is found.——The Mascot tunnel at 235 feet has disclosed a 6-foot vein with a footwall, the value in free gold running from $5 to $6 per ton; sulphurets, $80. This company owns almost two claims. E. R. Ray is the superintendent.

The *Mother Lode* says that the mines at Quartz are doing well owing to the recent rains and snowfalls in the mountains.——The App mine is putting in electric power.

Democrat: In the Republican mine, near Jacksonville, it is said that a body of ore has been uncovered almost at the surface, of a good grade of ore. A 60 H. P. hoist, capable of sinking 1200 feet, is being built. Men are sinking a shaft; the vein shows from 7 to 22 feet wide. Water has been struck and, if necessary, pumping machinery will be put in. The quartz in the Republican resembles that in the Jumper. The mine is owned by U. S. Marshal Shine and associates.—— At the Longfellow mine the mill is kept steadily running, and clean-ups are said to be satisfactory.——The old Connard mine at Big Oak Flat, operated by the same company which controls the Sell, has its new shaft driven 60 feet.——Four miners have been put to sinking a shaft 100 feet deep on the Mazeppa. More men will be added and a double shift put on within a few days.——At the North Star & Black Warrior mine on Moccasin creek the tunnel reached the east vein. The quartz body has not been crosscut but the rock uncovered shows free gold, and there is reason for believing that a chute of high grade ore has been tapped.——At the Black Oak a new 250 H. P. steam plant is being put in. The two 10-inch plunger pumps have put in and the mine is in full operation.——Supt. Summers of the Sonora mine, formerly known as the Scanavino, has a force sinking the shaft, which has reached 100 feet. On the bottom the vein shows 16 inches of free-milling quartz. At 130 feet the first level will be established and the vein drifted both ways.

Yuba.

(Special Correspondence).—The Good Title M. Co. has resumed work, which was temporarily suspended pending adjustment of title to the property. The property is owned by Cincinnati people, who recently visited the mine, and concluded to continue sinking the shaft and making other developments.

Dobbins, May 30th, '98.

H. Vischer is making progress in his work for the Debris Commission in the South Yuba river near Smartsville. He has sunk fourteen shafts to bedrock and is now making a map of the work to be submitted to the commission.

The Marysville *Appeal* says of the Pennsylvania mine that the ledge is as large and as valuable as when the recent strike was made, and there remain years of operation ahead. The mine has not shut down, but will within a very short time, or as soon as certain pending arrangements are concluded, be working more men than ever. Extensive improvements are under way at the present time.

NEVADA.

The Magnolia mine at DeLamar shipped another carload of gold ore of the value of $225 per ton. This is the second lot shipped from the property the present year, and the property is now in condition to make regular shipments during the summer. The haul to the railroad is long and expensive and only the ores that afford a valuation of $200 or better to the ton are marketed. While this high-grade class is being made to provide for developments and a sinking fund with which to continue in the winter, the vein is being steadily prospected, and to handle the main body a mill will be put in next season. Mr. Eisenman is Gen. Mgr.

The Victor mine, near Lovelock, has been sampled by four different experts; for 150 feet of the ledge the returns show from 42 to 62.5 ounces in silver and $6 to $8 in gold to the ton. A shipment of nine tons to the Reno mills gave 111 ounces in silver and $6 in gold to the ton.

At Eureka, owing to smelter competition in the ore markets, who have not only made a heavy reduction in the working charges, but also raised the price they pay for lead perceptibly, the Eureka sampling works has discontinued work.

The Humboldt Sulphur Co. will begin shipping sulphur via Humboldt station so soon as the wagon roads are in condition for hauling. ——The Dexter mine at Tuscarora last week shipped gold bars amounting to $6500, and auro-cyanides to amount of $4000.——M. Sohr has bonded the sulphur mines near Battle Mountain and will shortly begin work on them.——T. J. Bell has bought the New Pass mines situated on the western line of Lander county.——The Sunset mine, near Gold Creek, embracing eleven claims and some placer ground has been bonded to Eastern people and a contract let for 500 feet of tunnel.

OREGON.

The mill on the Bellevue mine at Bellevue is handling twenty-five tons of ore per day and outputting concentrates that yield from $60 to $70 per ton. The capacity will be increased to forty tons a day. D. Keith of Park City, Utah, is the owner.——The Barron & Sheppard quartz mine, near Ashland, is having fifty tons of ore hauled to the Ashland mill.——The Ashland-Mattern mine is running a full force and keeps its 10-stamp mill busy.——A ledge of copper ore resembling that of Iron Mountain has been discovered near Ashland.——The placer ground of Phillips & Co. has averaved 20 cents a yard for their season's work.——The Nonpareil cinnabar mines in Douglas county have been bonded to A. B. Quinton of Topeka, Kansas. ——The Ashland *Journal* says that C. E. Pot-

ter struck a piece of placer ground near Oak Flat which pays at the rate of 50 cents a wheelbarrow load. Three days' work, after hauling the gravel 250 feet, yielded $27.50. ——Browning & Hannum, on the Greenback mine on Grave creek, brought to Ashland a lot of gold dust and nuggets which were melted up into two gold bricks, one weighing $2500 and the other $1500, the result of crushing sixteen and one-half tons by an arrastra.

The Ashland *Tidings* says that Jones & Co., who purchased the Mt. Reuben mine, have at a depth of 350 feet crosscut the ledge and have 14 feet of quartz assaying well.

WASHINGTON.

The Cleveland mine, near Springdale, is shipping two carloads of ore.

Pioneer: D. Snyder discovered a ledge near Republic that assays 600 ounces in silver and $50 in gold.——H. Lily is developing a property which at shallow depth assays $14.10 in gold.——At Meyers Creek the Wisconsin mine is producing $60 ore.——The Medalion mine has a 6-foot ledge of $36 ore.

BRITISH COLUMBIA.

The following are the principal stockholders in the Le Roi mine and the amount they will receive from its recent sale for $3,000,000, if the sale stands:

V. Peyton, Spokane	$432,000
D. N. Peyton, Spokane	420,000
W. D. Turner, Spokane	240,000
W. J. Harris, Spokane	234,000
W. M. Ridpath, Spokane	228,000
George Turner, Spokane	192,000
J. G. English, Danville, Ill	129,000
D. W. Henley, Spokane	120,000
J. M. Armstrong, Spokane	120,000
W. A. Peyton, Danville	98,000
Mrs. W. D. D. Turner	90,000
E. D. Sanders, Spokane	90,000
Frank Graves, Spokane	84,000
C. L. English, Danville	81,000
L. F. Williams, Spokane	78,000
H. M. Casey, Spokane	24,000
L. D. Gass, Danville	24,000
W. J. C. Wakefield, Spokane	18,000
R. B. Blake, Spokane	18,000
J. B. McLaren, Vancouver	18,000

The R. E. Lee group of five claims, in the Slocan, has been bonded by L. Alexander to an English company for $100,000. Work on an 800-foot crosscut tunnel has begun.——Work is being pushed on the O. K. and Lucky Boy properties in Boundary Creek. The ore now on the dump is said to assay from $80 to $100 in gold.

The Highland, near Rossland, has found a second vein 15 feet wide. The ore in the new ledge carries some copper.

UTAH.

(Special Correspondence).—In the Treasure Hill mine, near Silver City, the ores are mainly oxidized iron, carrying silver values principally, though there are some sulphides. It is being developed from a 350-foot vertical shaft, with levels every 100 feet. The main working level runs 700 feet on the vein. About twenty-five tons per day are being taken out and shipped to the smelter. A strong vein of water was struck on this property. F. B. Cook is Mgr. and S. J. Penberthy Supt.

The Homestake, in the same locality, is being developed and has a 500-foot shaft. The Martha Washington shaft is down 350 feet, with two levels. Present workings are in ore. Some of their shipments brought good returns in gold, silver and lead.

The South Swansea is shipping 300 tons per month from the workings in their 750-foot shaft.

The Grand Central, whose grounds extend from the Mammoth to the Centennial-Eureka, is becoming an excellent property. The ore body comprises an immense zone. The shaft is 700 feet deep and from this shaft drifts are run 500 feet to cut the ore body, where the ore is produced from drifts and stopes. The vein or ledge is opened at the 200, 400, 700-foot levels. Two air drills are operated. Shipments run from two to two and one-half cars per day. For the month of April forty-eight cars were shipped. The values run from $30 to $100 per ton. The work of opening the mine has been under the immediate direction of Pat Donnelly, the foreman.

The Bullion-Beck is shipping seventy-five tons per day of first grade ore. This goes direct to the smelter, the company's concentrating mill being closed down. This ore, which comes from the 1300-foot level, runs about sixty-five ounces silver, 15 per cent lead and $1 per ton gold. On a different ore chute, in the south part of the mine, at 950 feet depth, the ore is running 10 per cent copper, thirty-five to forty ounces silver and $6 per ton gold. In general, a lean streak was encountered at 900 feet, but on going deeper the present stronger values were found. In this mine a large amount of ore is blocked out. About 120 men are employed under the superintendency of J. A. Kirby.

The Centennial-Eureka reports more satisfactory values from the 900 to 1100-foot workings, in the form of copper of higher grade. This is the new feature in later workings of this mine. The copper ore runs from 15 to 19 per cent. The property is not shipping heavily at present.

Tintic district freight rates average about $2.50 per ton on ore shipped. Smelter rates are governed by contract, according to the grade of the ore and as to lead values. It is estimated that the district ships about 9000 tons per month. The Taylor & Brunton Ore Sampling Co. report that for the first four months of 1898 they have handled 13,000 tons in excess of the quantity they handled within the corresponding period of 1897.

Eureka, Utah, May 17th, '98. WASCOTT.

(Special Correspondence). — When the decision was made by the Highland Boy management to build their present amalgamation and cyanide mill, their underground workings were in the main confined to an extensive ledge of oxydized ore, with values largely gold. Subsequent and deeper workings have taken them through the oxydized ores into a still more extensive zone of copper sulphides, which require the work of a smelter. A walk through the various tunnels of the mine shows that there remains an abundance of milling ore in the oxydized belt, but the company claims there is no economy in milling it, when the ores of the entire proposition can be smelted with a better result. A decision has, therefore, been reached to build a smelter down in the valley, and build a railroad from the smelter to the mine. It is announced that the mill will be closed down very soon. The mine is developed extensively from three tunnels. No. 4 cuts through the oxydized ledge into the sulphides and is 1300 feet long. No. 5 is 1200 feet long, all in sulphide ore; No. 6 is in 700 feet in the sulphide ore.

The Old Jordan and Galena are about completing a cyanide plant to run in connection with their concentration mill. There are crushing, rolling and drying machines and nine leaching tanks, having a capacity of 100 tons per day.

The Fortune mine in Pine Gulch is opened by several tunnels. The main tunnel runs in on the vein a distance of 1500 feet; a second, above the main, goes in 600 feet on the vein, and a third 350 feet. The ores in the upper tunnel are carbonate of lead and silver; galena and copper in the lower; and sulphide of copper, carrying gold and silver, in the main tunnel. Some shipments have been made from the lower tunnel. A mill will be erected here.

Geo. L. and Fred H. Bemis of Bingham; John L. Weber and John J. Kearns of Park City, and D. N. Swan of Salt Lake City, are completing a concentrating mill at Bingham. It will be known as the Dewey Consolidated.

Bingham, Utah, May 20, '98. WASCOTT.

From a fourteen-day run the Mercur mine yielded $23,100. The mill crushes 150 tons of ore per day. The company contemplates building an auxiliary plant.——The Montreal mine near Milford, recently purchased by the Glasgow & Western Expl. Co., has begun work.——Developments on the Cuba, near Bingham, have resulted in finding ore running high in copper and carrying some gold. ——In the property of the International M. Co. at West Tintic good milling ore has been found 250 feet from the surface; the vein is 15 feet.——The finding of an 8-inch vein of good ore is reported in the Sunday claim.——W. Green, working the Buckeye mine under lease, reports the discovery of a 2-foot vein of good ore on the 270-foot level, and shipments will commence shortly.——The Tintic *Miner* reports a shipment of eighty-one cars of ore, fourteen cars of concentrates, and twenty-five bars of bullion.——The Ajax shaft is 572 feet deep, 20 feet having been sunk during the week.——The Mammoth made a shipment of crude ore.——J. W. Judd disposed of a small interest in the Napoleon claim near Mammoth for $1100.

F. M. Bishop of Salt Lake City is said to have found a sulphur deposit near Sunnyside that is 50 feet in width, can be traced 500 feet and in places stands 20 feet out of the ground. ——At the Mammoth mill sixty stamps, the full number of the mill, are dropping regularly and a total of 200 tons of ore being worked daily. The new East Tintic railway is hauling down the hill the greatest tonnage in its history, being an average of about 300 tons daily. Last Saturday the road made its star record of 443 tons.——In the Dalton and Lark, which has been submerged for many months, the water is reduced to the 800 level, and by June 1st all the drifts will be accessible and under full operation. Mgr. Schenck expects to begin the extraction and marketing of ores fifteen days later, and will then push the drift leading to the big lead bodies in Dump ground. From the silver zone assays made just before the pulling of the pumps show from 20 to 250 ounces per ton.—— The Martha Washington made another shipment of ore. Although the pay streak at the property at this time is such as to restrict it to periodical shipments, the grade of ore is high and nothing containing less than 100 ounces in silver is permitted to go into the lot. Associated with this is $4 in gold.—— The Horn Silver shipped seven cars of concentrates, while the Niagara sent in eight cars of crude ore running in silver and lead from Bingham.——The Hercules, near Stockton, made a strike by which it is believed the largest body of ore found in that locality has been uncovered. The strike was made on the 200-foot level and has been crosscut 20 feet, without reaching the limit. The values are about 50 per cent lead, 30 ounces silver and $7 gold.——The Hercules is producing a good grade of lead and silver ore.

On the Golden Dream mine at Monticello a large quantity of ore ranging from $30 up, in free gold, has been piled on the dump during the last month.

A. P. Adams of Albany, N. Y., and Engineer E. H. Ryan are on the San Juan river, near Monticello, preparing to run a tunnel through one of the goose necks, of which there are many on that river. The tunnel will be about 4000 feet long, and will drain four and one-half miles of the river bed, along which four and one-half miles A. L. Raplee, with hand rockers and a water wheel, has for three years made a comfortable living. The new company, the San Juan River Placer M. & P. Co., proposes to work this stretch of placer ground on a larger scale and will put in machinery this summer to run air drills and push the work. This section of the river has bars which yield from 3 to 50 cents per yard in scale gold.——The Hickory and Montreal mines, near Milford, have resumed ore shipments. The product is copper, gold and silver.

The Mercur *Mercury* says the Mono tunnel has reached a distance of over 2000 feet. The character of the ground in the tunnel is changing, and it is expected that a strike will be made in a short time.——At the Glencoe the tunnel has reached 600 feet, from which point crosscutting has begun.

At Fish Springs a strike of high grade silver and lead ore has been made in the Last Chance No. 1 by Thomas & Evans, who are working the mine on a ninety-day lease. The shaft is down 45 feet and the ore body covers the entire bottom.——Brown & Higgs, who are working the Last Chance No. 2 in the same locality, are taking out sufficient good ore to pay expenses.

Hawkins & Co. have a showing of copper ore near Frisco that indicates the proving of a new mine. An open cut has been made for about 30 feet in length by 6 feet in width in ore almost the entire dimensions. Forty sacks of the ore will run 30 or 35 per cent copper and $5 gold to the ton, and the second-class dump is said to average 8 per cent copper, $2 gold and five ounces silver. The property is known as the General Solomon mine.

Tribune: The ore and bullion market settlements for last week amounted to $287,776. The figure is the largest attained by any corresponding period the present year, and now that the roads between the mines and railways are drying up, sampling men and ore buyers are relying on a steady increase.

Tribune: The Daisy mill at West Dip will be ready for operation July 1st. The plant will have a daily tankage capacity of 300 tons. Mgr. Mayne is pushing work underground. As did others, Mr. Mayne demonstrated in an experimental plant that the ores of the Daisy could be successfully cyanided, and as the work of construction goes on, experiments by which to determine the smallest amount of cyanogen necessary to get out the gold are kept up. In this he has made valuable discoveries. —— Capt. DeLamar's representatives have bonded several properties at Bingham and are making experiments on the ores. The results will be submitted to Capt. DeLamar upon his arrival in July.——The station for the pumping plant in the property of the West Mountain Placer Co. at Bingham is completed. Within a few weeks the raising of water in the shaft will be commenced. The station has been made at a depth of 150 feet from the surface and will be occupied by a Corliss engine of 120 H. P, together with a Cornish pump capable of 1500 gallons per minute.

IDAHO.

(Special Correspondence). — The Twin Springs Placer Co. have developed and practically completed a hydraulic mining enterprise on the Boise river, forty miles northeast of Boise. The project was started two years ago and the work has been done under the management of J. R. Anderson, with J. O. Bouse as engineer. Twenty-eight miles of wagon road, a sawmill and eight miles of flume have been built. The flume is 6 feet 2 inches wide in the clear, carrying 5 feet depth of water and having a grade of 10 feet 8 inches to the mile. The flume line includes two rock tunnels, 668 and 185 feet long, respectively, which are side-lined and full size of the flume. The line crosses the Boise river through an inverted siphon, which is of 4-foot pipe, works under 370 feet head of water and is supported by a bridge of 140-foot span, 85 feet above the water. The lower section is made of ¾-inch steel, double riveted. It has four expansion joints. The siphon, which will be completed in June, will furnish new scientific data. It is claimed to be the largest of the kind in the world, both as to diameter and degree of pressure. The flume carries 10,000 inches of water. There are fourteen giants working at different points under an average of 320 feet pressure. The company own thirty-two miles of the channel and contiguous grounds along the Boise river.

Boise, Idaho, May 26th, '98.

(Special Correspondence). — The most important development in the Hailey district is on what is known as the gold belt, twelve to fourteen miles west of the town of Hailey. More properly it may be called the iron and copper sulphide belt, carrying gold values, to distinguish it from the argentiferous-galena belt, nearer town, where the old workings are. This gold belt, according to local authority, can be traced fifty miles to the westward. Sufficient work has been done to warrant much confidence in the future of that belt; and Hailey, in the picturesque Wood River valley, is already feeling that her mining energies may be partially turned from the silver properties of the old region to the development of the gold belt with far-reaching results in her favor.

The best development in this belt is found in the Tip-Top mine, in charge of Capt. J. M. Lusk and belonging to J. Q. Packard of Salt Lake City. This property is developed by about 2300 feet of levels and crosscuts and an incline shaft 325 feet deep. One level goes in 600 feet on the vein, from which various side workings occur; another level 100 feet below the first follows the vein 750 feet, and connects with No. 1 through a winze; a third level still below the first two, has been driven 100 feet on the vein. The ore chute is between 300 and 400 feet in length. The vein runs from 5 to 15 feet in thickness, and dips at an angle of 45 to 60 degrees. The ore is an iron and copper sulphide, the main values being in gold. To the depth of 450 feet they are partially oxydized and it is believed from 40 to 50 per cent of the gold therein may be saved by amalgamation. The gangue rock is a quartz and porphyry-granite. The superintendent asserts that the building of a mill is contemplated, but that to avoid any mistake as to the kind, the most thorough tests are first being made. This property is well equipped with buildings and facilities for development.

The Golden Star, a mile or two from the Tip-Top, is simply undergoing development, but in the course of this work its ores will be milled, the management having leased Camas No. 2 mill which is equipped for amalgamation and concentration. It is expected this mill will start up about June 1st. The mine shaft is down to a depth of 240 feet and sinking continues. Levels are being run at 100 and 200-foot points from the shaft. The shaft, slightly inclined, goes down under the footwall of the vein. The ores encountered are similar to those of the Tip-Top. This property belongs to Chicago and St. Louis parties who have ample capital. J. Ainsworth is superintendent.

The Burning Moscow, in the vicinity, is being developed by Doniphan Bros. On this property a ledge 12 to 15 feet wide has been tapped by a crosscut tunnel 400 feet long. This is in the midst of a lava formation and the vein is somewhat broken.

The Idaho Recovery Co., of which Messrs. Wiswall & Frank, of Denver, are managers, are operating a cyanide plant on the tailings from two different mill sites. The work of the season has just been inaugurated by Mr. Frank, and some twenty or more solution tanks are being used. This plant is situated at Doniphan, in the gold belt.

Nearer Hailey are the Crœsus and Hope, neither one operating to any great extent at present, which carry good gold values in iron and copper pyrites. The Crœsus has a 10-stamp mill. It is believed that both of these will soon be started up.

The Jay Gould, at Bullion, in the silver-lead belt, is working with a good force of men and is shipping regularly.

The silver-lead belt extends from Bellevue to the Sawtooth range, about seventy-five miles, and is from eight to ten miles wide, with varying values.

The shipments of ore from Hailey to the smelters amount to about 200 tons per month. The sulphide ores go to Salt Lake City and the galena ores to Colorado smelters.

Hailey, Idaho, May 28th, '98.

Rand & Burd have sold three claims to an English company. The price is locally reported to be $250,000. The property is 46 miles from Boise, the nearest railroad point. One of the claims is developed to a depth of 622 feet. The new owners have put ten men to work.——Wells Bros. have made a quartz discovery near Payette. The ledge is 3½ feet wide and the ore will mill about $40 a ton. They have two claims.——In the Tip Top mine near Hailey an ore body has been found from 3 to 38 feet wide and 300 feet long at a depth of 200 feet. The 300 level is also being opened.

The Basic M'g Co. is engaged in building a dredge at Placerville. The boat is 100 feet long and 40 feet wide. It will draw 3½ feet of water. The hull is 7 feet deep. The plan of working by dredges of this character is to dam the stream, making a pond in which the dredge is floated. The water for sluicing is pumped from the pond. The dredge will be operated by electric power. The electricity will be generated by water power. Fourteen miles of ditch have been constructed. Of this three and one-half miles is of flume 4 feet on the bottom and 3 feet high, having a capacity of 1000 miners' inches. The fall will be 350 feet and the power afforded will amount, at the minimum, to 500 H. P. The line over which this power will be conveyed to the dredge will be between ten and fourteen miles in length. The company owns twenty-four miles of creek bottom.——The New York mine, near Idaho City, has been sold to a British Columbia company, represented by Irving of Vancouver. The consideration has not been made public. A first payment has been made and the new owners have put men to work. This is a gold property, considerably developed, and shows large bodies of ore of fair grade.

Prospectors have recently staked out a large amount of placer ground on the bar between Boulder and Gold creeks, near Coolin. It is claimed by the parties who did the work that they are employed by a company of Spokane and Eastern capitalists. It is said that the company will put in a large hydraulic plant. They will take the water from Boulder creek, where a good head can be obtained high above the bars.

Two sets of Cornish rolls have been put in the DeLamar mill at DeLamar, and the ore will go into the leaching tanks crushed to more uniform size than formerly. The mill, at greatly reduced expense, is handling more ore and giving better results than the old process. More men are being put in the mines.—— The Johnny Sheals mining property, near Mountain Home, was sold to Denver people. It is the intention of the company to expend $100,000 in development work, beginning this fall. A mill run of forty-one tons averaged from $60 to $65 a ton.

At Silver City the tunnel on the Mammoth has reached 250 feet in a hard formation.—— At the Cumberland mine the mill is running steadily and bullion shipments have begun. The lessees, Sonneman & Branscombe, have expended $25,000 on the property since last September in development.

The Salt Lake *Herald* says that the McNutt placers on Moose creek, near Leesburg, have been sold to a Chicago company for $150,000 cash. The same company is operating two electric dredges at Bannack, and it is the intention to use two similar dredge boats on the McNutt placers, which are to be extensively worked this summer.

Statesman: The New York mine in the Basin has been sold to British Columbia mining men. The purchase was made by Dr. Irving of Vancouver. He has made the first payment and work has been started. The property is near Idaho City.——The cyanide plant recently installed on the Golden King mine at Dixie is reported an entire success. The ore being milled runs $10 a ton in gold and some silver. The extraction is close to 90 per cent. The plant is handling twenty-five tons a day crushed dry through a 20-mesh screen. Two hundred tons were worked as a test. Each lot was cleaned up separately and the results determined. It was found it required one and a half pounds of cyanide per ton to extract the precious metal and about a pound of zinc for purposes of precipitation. The tanks used hold twenty-five tons each. It requires seventy-two hours for the leaching process to be completed. The cost of cyanide laid down is 35 cents a pound, making the cost per ton of ore for the chemical 52½ cents. The zinc shavings cost 6 cents a pound. Mr. Brant thinks the amount of zinc required after the

plant shall have got into good running order will not be more than half a pound per ton of ore.——C. P. Richardson, near Newsome, has a 30-foot bank of gravel on the Moose Creek placers which prospects well, with 5 feet of pay on top of the bedrock.——Gavin & Co. have bonded the Buckeye quartz claim in Dixie district and begun development work on the claim.——Pennman and Yetter's property, near Elk City, is showing a body of ore 4 feet in width of good values.

MONTANA.

The Elgin mine at Rochester is operated under lease by a Butte company. An ore body running from $20 to $30 has been opened, the daily product being about ten tons.——The Buffalo mine has 4000 tons of ore on the dump.——The season promises to be a very active one in placer. Alder Gulch will give employment this year to at least 100 men.——Work on the big dredging plant of the Conroy Placer M. Co. has begun. M. Delaney of New York will have charge of the construction. The plant is designed to handle 1000 cubic yards of gravel daily.——The German Bar Placer Co.'s plant is in operation.

The South Bend M. & M Co., South Bend, Ind., capitalists, has secured 160 acres of placer ground near Libby. A force has been put to work sinking shafts to bedrock in various places, and several thousand dollars will be expended in prospecting. So far the returns have been satisfactory, and there is little doubt that the company finds itself justified in putting on expensive machinery. The ground covered by the claims also contains numerous old channels. One feature of the company, never tried in Libby, is saving the black sand which forms the residue in the pan. Repeated tests of the sand show that it carries a value in gold, with no trace of any base. It is also rich in iron, which gives it specific gravity, and renders it valuable to the smelters as a flux. Enough of this black sand to make a smelting test will be shipped, and, if the result is satisfactory, concentrating tables will be put in. The plan of the company is to put in a dredge. R. L. Nicar is Gen. Mgr.

The *Miner* says that at the Alice mine and mill twenty men were let out during last week and twenty stamp heads stopped in the mill. This leaves a total of forty heads now at work. The suspension is owing to a temporary shortage of ore, and in all probability the men will be reinstated shortly. There are about 100 men working on leases in the Alice and the Magna Charta.——The Butte & Boston at the East Gray Rock has begun sinking from the 1400-foot. The water is very fast in this mine, and, although a large pump constructed from an air compressor is in use, great difficulty is experienced in handling it.——At the Hope mine, at Basin, the shaft has been sunk to the 400 level, and by June 15th is expected to be down to the 500. Before then a new hoist will be put in, as the present plant is not strong enough. It is said that the Basin Gold & Copper M. Co., which now owns the property, has spent about $32,000 for machinery, labor and supplies since beginning work in January.——It is stated that the reorganized Golden Sceptre Co. at Quigley will soon be in operation. J. R. McDonald has succeeded in reorganizing the company on a solid basis and has made arrangements to have the plant, on which $650,000 has been spent already, completed in a very short time. The tramway from the mill to the mine will soon be in operation. The ore is low grade gold, running about $4 to the ton; but with the mill and tramway completed, it is said it can be treated for about $1 a ton. The machinery for the mill, including an electric plant, is all on the ground and will soon be in place under the general management of J. R. McDonald.——It is reported in Butte that the Con. Granite Mountain Bimetallic Co. will soon resume work on their silver properties near Phillipsburg.

Helena *Independent*: F. Longmaid has been sampling a placer mine near Beartown and has returned with a sack of gold. He secured an option on the property at $10,000 last fall. To thoroughly prospect the property he utilized the melting snows of the spring in washing the gravel through a steam washing plant. Two thousand yards were treated, and the result averaged 90 cents a yard. Mr. Longmaid estimates the cost of operating at 25 cents a yard, and figures the amount of undeveloped ground at 600,000 yards. It is intended that 500 yards a day shall be handled. A steam shovel and pumping plant will be used in the work.——J. Leahy will have charge of the dredging plant initiated near Montana City by A. MacDougall of Duluth. Work of this year will begin shortly. He is putting in an elevated dredge. The centrifugal pump operated last year was not a success, and the owners lost money on the season's run. With the new plant it is expected that a yard a minute will be handled with eight or ten men, and hopes of a profitable season are based upon the new method to be introduced.——The Great Falls *Tribune* says there is more activity in mining matters this spring in the various camps of the Little Belt mountains than has been apparent for several years. The purchasing of ores and leasing of mines by the United Smelting Co. at Great Falls has been a large factor in the mining industries of Barker and Neihart, which are now two of the busiest silver camps in the State. As regards other sections in the Belt range, prospecting and developing have been going on quietly for a year or two, with the result that this year, if cheap transportation can be secured, new producing mines will be in the field. In Yogo, Frazen & Co. have a 200-foot tunnel in on a large vein of sulphides and carbonates, bearing lead, silver and gold. Assays from ore on the dumps, of which there is considerable, give 40 ounces silver, 50 per cent lead and $3 gold.——It is stated that the Alabama Co. at Landusky contemplates erecting a cyanide mill to be put in operation on the Alabama mine. The company is the owner of seven mines in the Little Rockies, the Alabama being the only one developed. Twelve tons of its ore were hauled eighty miles overland and shipped to Aurora, Ill., and are said to have netted $5900.——The Judge mine at Castle has 700 tons ore ready for shipment.

The Dillon *Examiner* says that Jones & Austin of Chicago have bought a large property in Madison county, mines which have been worked for several years, principally for lead, but the ore contains gold and silver values which by a process of concentration Jones & Austin expect to make the leading factor in the productiveness of the property. Fully 20,000 tons of gold ore are in sight in the 900 feet of shafts and tunnels, besides 250 or 300 tons of lead ore, which runs 70 per cent pure. It is proposed to put in machinery this summer to work the gold ore, also a system of ditches and a water wheel for the development of the water power available.

SOUTH DAKOTA.

The tunnel in the Power mine at Two Bit has reached 200 feet. They have a ledge 3½ feet wide that assays $22.40 per ton.——The shaft in the Chicago & Two Bit Co. has reached 325 feet.——The shaft at the Great Northern has reached 185 feet, and traces of copper have been discovered.——The American Express property has discovered a new ore shoot. The ore shipments from this property last month were over 500 tons.

WYOMING.

Near Rawlins, Denver and Salt Lake capitalists have invested over $100,000 in placer properties which will be operated this summer.

MICHIGAN.

The Boston News Bureau is told that the No. 6 shaft of the Osceola mine is the best shaft and will probably be the most profitable shaft ever put down at Lake Superior. It will in time take the place of two or three other shafts and will take out more copper mineral the next ten years than any present shaft at Lake Superior unless the Whiting shaft of the Calumet & Hecla is made to do duty. When the levels in this shaft are opened up the output of the Osceola mine proper will be enlarged, while the output from the Tamarack Jr. of the Osceola and from the Kearsarge property with the new Iroquois shaft will be increased.

ONTARIO.

The Cameron Island mine, near Rat Portage, has delivered 100 tons of ore to the Kewatin mill for a test run.——At the Independence mine at Sturgeon Falls the 5-stamp mill is in operation. Some of the ore mills as high as $140 to the ton. Development work is being pushed.

COLORADO.

In the Victor mine, Cripple Creek, the main shaft is 680 feet deep and the last level runs 80 feet above that point, in good ore. The mine is outputting from 100 to 125 tons per day. The first grade is settled for on an average of $250 per ton, while the second grade is good for $80 to $100, while the third or mill ore averages close to $25 per ton. Mgr. N. H. Cone says there is hardly an end to the amount of low-grade ore in sight in all of the levels, while of the high-grade there is sufficient to meet the big payroll for a long time to come. This mine has paid dividends in the past five years close to $1,000,000. The ten or more ore teams loading at the mine are a thing of the past, as everything in the ore house now goes into the cars direct, and a big engine hauls it to market over the Florence & Cripple Creek road.——The output of the Legal Tender is approximately sixty-five tons per day, the smelting grade averaging from four to five ounces, while the mill dirt carries about one ounce per ton. The shaft is down 600 feet and within the last 10 feet passed through the vein that dipped into the shaft where the pay streak was found 4 feet wide. Sinking is to continue for 200 feet more before another level is started. Mgr. Cone says he is not crowding work, but slowly opening up a mine for the future. At present he is meeting the running expenses in addition to the usual dividend of $10,000 per month.

The Raven is outputting about enough ore to meet the payroll and the regular dividend of 1 cent per share. A great deal of development work is being done. A crosscut has been started from the tunnel to prospect a portion of the company's ground not yet entered by the tunnel. This crosscut will cut the Wide Awake at a depth of fully 800 feet.——Some very rich ore is being mined in the Elkton. Shipments have been made from it in the past that in carload lots went as high as $200 per ton.——Crosscutting for the vein from the bottom station of the Anchoria-Leland at 800 feet has commenced. The shaft has been run down until the capacity of the pumping plant was reached, and in a short time the vein will be opened at a depth reached by the Portland and the Independence. To more directly aid the work a diamond drill has been sent out from the shaft to locate the ore, and it is understood the test has been entirely satisfactory.——Saunders & Co. have resumed shipments from their lease of the Isabella Co. They are again in good ore at 270 feet and are shipping from fifteen to twenty tons daily.——The Meldrum tunnel at Ouray has closed down temporarily.——Cripple Creek mines are paying dividends at the rate of $2,000,000 per annum. Total dividends to date, $5,000,000; total output, about $38,000,000.—— A strike has been made in the Calumet mine, Ohio creek, Gunnison county. Eighteen inches of sulphide ore, that will assay two ounces gold, twelve silver and 80 per cent lead, is said to have been uncovered. There is also 2 feet of concentrating ore that will assay $20 in gold, silver and lead.——The Rebekah M. Co. at Gilpin, operating the Gettysburg, contemplate putting in hoisting machinery at the mine and erecting a 10-stamp mill, rapid drop, with the latest improved concentrators.

The Revenge mining property, near Eldora, is in paying ore. This claim is being worked under a bond and lease of $20,000. The three first shipments ran $54, $112 and $96 per ton, respectively. The tunnel is 210 feet on ore all the way. The vein is 6 feet wide, while the pay streak averages 1 foot of high-grade ore.——The Besse R claim on Spencer mountain shows a 3-foot vein of sulphide ore.——The Grover Cleveland and Summerset mines, on Spencer mountain, at the depth of 60 feet, shows a vein that runs $150 first grade and $50 second grade per ton.——At Victor steady shipments are made from the Mattoon lease on the Shertloff, the ore running from $25 for mill stuff to four ounces for first grade. Edwards & Wolfe, on the Star of Bethlehem, are continuing shipments from the 70-foot level, while pushing down the shaft.——A good strike has been made in the Penobscot claim, near Central City, the ore giving assay values of twelve ounces in gold per ton.——The production of the Carr mine on Bobtail hill for the past month was $2875, taken out with a small force. The production was five tons first-class smelting ore at $115, twenty tons second-class smelting ore at $85, eight cords mill ore, $600.——At the Next President mine, drifting in the 380-foot level, Supt. McLeod has been taking out some fair ore, the pay streak showing yellow copper and lead, though not in sufficient body as yet to make shipments.

At Cripple Creek the Gold Coin mine is outputting 130 tons per day.——Lessees on the Colorado Boss are getting ore from a shaft 75 feet deep. The rock is expected to ship at from $40 to $60 a ton.

In the Lost Lillie at Cripple Creek is a streak 4 inches wide which assays twenty ounces silver, $10 in gold and 15 per cent in lead.——In the Christmas lease of Potvia & Vaine the output last month was 400 tons that averaged $40 to $50.

The find of gilsonite in shipping quantities, in Middle Park, has opened a new industry in that section. The product will give a profit of $6 per ton after being hauled by wagon to Empire and sent by rail to Denver.——The 40-stamp mill of the Gold Coin Mines Co., near Nevadaville, is working on ore from the Indiana and Hidden Treasure mines.——The Hubert mine, Gilpin county, is keeping a 30-stamp mill running twelve hours a day.——Illinois capitalists have organized under the title of the Brunswick G. M. & D. Co., and will operate the Wheaton, Martin and Ettie lodes, located in Lake district, Gilpin county. There is little development done, but enough to show some good ore.——Work on the Bourbon mine, Fall River, has been stopped by the rapid inflow of water at the breast of the 600-foot adit. At this distance the adit has 400 feet surface depth.——The Winnebago M. Co. have purchased, for $75,000, the property of the Gold Area M. & M. Co. near Central City. The property comprised 8750 feet of lode claim, a five-acre millsite and the machinery and tools.——At 85 feet a vein was caught in the Longfellow mine, Cripple Creek, and a twenty-ton shipment of $40 ore made. The Saratoga mine, in Clear Creek, is being persistently developed. The shaft is 900 feet deep. The water is coming in rapidly on the east 600-foot level. Good-sized ore bodies are opened and ready for stoping in the 800 and 900 levels. The ore is shipped to Black Hawk and there is talk of erecting a concentrating plant near the property.——Three mines of the San Miguel section shipped twenty carloads of ore from Ophir. This makes 286 carloads from the district since January 1st, of which the Iron Springs mine has shipped 174.——The output of the Monument, Cripple Creek, was last month 125 tons of $60 ore.——Leadville and Denver capital has taken hold of the Ground Hog mine, in Eagle county. They have secured a lease on the Consolidated interests, and work will soon commence.——Development continues in the Garfield Con., Cripple Creek. In the 30-foot winze from the 310-foot level a 2-inch streak is said to give $1000 per ton. In the fifth level a 6-inch streak of $800 ore is being worked. The daily output is ten tons of $60 screenings and one ton of $700 ore.——Lessees have opened a vein on the Shoo Fly measuring 5 feet in the 100-foot crosscut showing a value of $40 per ton.——At Leadville, W. T. Harris & Co., lessees on the Elk property, report good results. They are taking out about twenty tons per day of iron ore; they are also getting about 150 tons per month of a good grade of lead ore.——Among the new work the lease on the Nisi Prius will be operated on an extensive scale. These people have from 160 to 170 acres in this lease.

A. Hickman has opened a new chute in the old shaft on the El Paso at Cripple Creek. He broke into a vein that carries 2 feet of ore that assays from $20 to $200 a ton. A trial shipment returned $37 a ton.——Shipments from the Foley & Nixon block leases on the Los Angeles of good mill ore were made.——The initial shipment from the Lafayette will consist of three broad-gauge cars of ore, one of which is expected to run in high smelting values.——H. A. Von Hemert is making a thorough examination of the Ironclad workings and hoisting some ore. Twenty men are employed, but work is not yet under full headway.——M. Parsons shipped forty tons of $30 ore from the Shertloff.——The *Evening Telegraph* says of the Portland that the mine in May cleared $100,000.——A carload of ore from the Village Belle mine at Eldora was sampled by the State Ore Sampling Works. The second-class ore returned $246 to the ton, the third-class $62.40 and the fourth-class $23.

A property is being developed at Frisco, in which the veins run from 5 to 20 feet wide. The ore is generally iron and copper, with shoots and pockets of lead running from $10 upward per ton gold. The Victoria, comprising four claims, is opened for over 2000 feet, showing from 3 to 10 feet of ore that runs from $7 to $49 per ton gold. The Copper Queen shows from 1 to 5 feet of ore, assaying from $20 to $60 per ton gold.——The King Solomon tunnel, heading for Peak No. 1 in Ten-Mile range, in 3000 feet gets 2700 feet depth, and cuts sixteen known veins, all carrying pay ore. This property is being equipped with air drills, compressors run by water power.——In the Gregory Gold M. Co.'s property at Black Hawk the leasing company struck 6 feet of mill ore running from $8 to $10 a ton.

E. M. Brown is working six men on the Ben Butler mine near Silverton. He has over 200 tons ready for shipment. The Ben Butler vein is 30 feet wide, and at one point the ore body is 14 feet in width.——Prospecting Copper mountain veins at Cripple Creek has received a new impetus from the improvement in the Lost Lillie, worked by Hankey & Cole. From a shaft being sunk to the southeast of Fluorine and on the strike of that vein they are getting assays as high as six ounces at a depth of 70 feet.——At La Plata the Swiss company struck another body of tellurium ore in their upper workings.——The Columbus mine has put extra men to stoping and sorting ore. They will ship 100 tons of high-grade ore.

A body of free-gold ore was found in the lower level of the Butterfly mine at Ames. The deposit is in 900 feet at a depth of 700.——Killum & Ogilvie at Cripple Creek are shipping from twelve to fifteen tons a day. The first grade runs from $300 to $400 a ton, and the second grade $50.

The Chemung-Belmont, near Black Hawk, is making shipments of smelting ore which are giving satisfactory returns, the last lot giving values of 5½ ounces gold, 20 ounces silver and 6 per cent copper per ton, or a net value of $110 per ton.

Georgetown *Courier*: A large dike of eruptive rock has been struck in the lower level of the Pelican mine, 2000 feet from the surface. The level has been driven a long distance through barren ground. The dike furnishes enough water to run a mill, and comes through the drill holes with such force that it shoots 10 feet out into the drift. The character of the rock is different from that of the dike which has followed the Pelican vein for 6000 feet, being darker and containing a large amount of black mica in minute crystals. The feldspar crystals are altered to kaolin through decomposition. The dike cuts the Pelican vein in two, and probably throws it, but this will not be definitely known until it is crossed. It has been penetrated about 25 feet.

NEW MEXICO.

The El Paso Smelting Co. at Cook's Peak continues work on its Othello and Desdemona properties. A strike was made recently of a large body of copper assaying 18 per cent. The ore heretofore taken out has been high-grade lead carbonates and galena carrying silver, and this is one of the first indications of copper in the camp. The company is averaging shipments of seventy tons per day and is employing a force of over 100 men.

Cooks Peak produces 350 tons of ore per week that averages $25 per ton in silver and lead, making an output of $8750 per week.——The Confidence mine is working seventy men. A large part of the force is employed in development work.——At White Oaks, on the Old Abe mine, the shaft has been sunk 900 feet. The development work alone has more than paid running expenses.

ARIZONA.

The Black Warrior Copper Co., near Globe, is shipping ore from the Montgomery, which is one of the fifteen claims belonging to the company. The ledge is 20 feet wide and the ore is cheaply mined. It averages 15 7-10 copper and is of a character to flux with the ores of the United Globe mines, which company has contracted to smelt it.

J. A. Fleming, Pres. Black Warrior Co., is practically the sole owner. About twenty tons of ore are being delivered to the United Globe smelter daily, at a cost for mining and hauling of $3.25 per ton, leaving a profit of from $10 to $12 per ton. There is said to be enough ore in sight to insure shipments for a year.

A. F. Kent has sold one-half interest in the Sterling mine, near Prescott, to M. S. Taft for $2800.——L. M. Olden and others sold to the Montauri Gold Co. five claims in Cherry Creek district for $26,000.

Prescott *Courier*: At Jones' mill, Chaparral, the fifty-ton cyanide plant and mill are in operation. In the 1300-foot tunnel — which was originally run to tap the Little Jessie and shortening the line of transportation of ore to the mill—a body of porphyry 20 feet wide has been found, that carries gold enough to admit of profitable working in the cyanide plant. The Little Jessie has produced $600,000.——On the Cumberland mine, Pine Flat, a small force is working with good results. At the bottom of a shaft 100 feet in depth 4 feet of $35 gold ore is exposed.——Searles Bros. are working the Eclipse silver mine. They have forty-one men on the payroll. Six men sort the ore, much of which is high grade.

The Blaisdell mine at Picacho is completing its mill and cyanide plant and expects to be producing bullion shortly.——At the Montezuma mines in the Huachuca mountains work is progressing satisfactorily.

The Temple Bar Co. of Mohave county is working sixty men prospecting large hydraulic mining operations.——The McElroy mine of Blakely & Lynch in Mohave county is turning out sufficient ore to supply their mill.——W. Zent has ore in his Longfellow mine, near Prescott, that assays $56 gold per ton from a vein 23 inches wide.

At Clifton a quantity of low grade ores is a desideratum in copper production. Half of the copper produced (twenty tons daily) at Clifton comes from copper ores yielding respectively three per cent and seven per cent. The former is dissolved by sulphuric acids in vats — the copper settling at the bottom from whence it is removed to the furnace and on to the concentrators for refinement. The 5 per cent, 6 per cent and 7 per cent ores are crushed and separated by jigs, distributing four sizes to mills which grind fine and then are concentrated. Sulphide copper ores which formerly were considered an expen-

sive ore to treat are now being worked advantageously and the sulphur, formerly a great hindrance, which had to be expelled by roasting, is now utilized for fuel in pyritic smelters.

The Yuma *Sun* says that the Oro Bell mine, in Yavapai county, which has been worked without profit in years past by several companies, is now turning out concentrates worth $100 per ton. There are twenty-three men on the payroll.——The ore body in the Tennessee mine in Mohave county has increased in width and the ore in value from the 100 to the 200 level. This mine has good ore and plenty of it and an abundance of water.

MEXICO.

The shaft of the New York & Sonora M. Co. at Las Cruces is down 230 feet, and the crosscut at that level develops a strong ledge. A smelter is to be erected at the same place. ——M. Bornio & Co. have sold to M. Sieberling of Peoria, Ill., and associates the Las Planchas de Plata silver mines—a group near Nogales. An eighty-ton reduction plant will be erected.——The Esperanza & Francisca M. Co. at Guacomea employs 100 men. Development work is pushed and good ore produced. The mill is run twelve hours per day.

The Lustre M. & M. Co., operating near Magistral, Durango, contemplates erecting a cyanide plant. The company operates a 40-stamp mill and chlorination works. The property comprises seven claims. The output amounts to 100 tons a day and 150 men are employed. It is a gold producer. The property is owned by Pittsburg people. W. E. Koch is Gen. Mgr.——The Neuva Union Co., near El Oro, has 16,000 tons of tailings on hand. —— F. H. Garcia, near Nacosari, Sonora, has leased La Dirrota mine to an American company, who are to open the property to a depth of 300 feet.

AUSTRALIA.

The gold production of Australia, during the first three months of 1898, was 702,934 ounces, against 543,910 ounces in 1897. For the same period the increase was about $3,000,000.

Personal.

JAS. D. HAGUE has gone from Grass Valley, Cal., to New York City.

STATE GEOLOGIST T. A. RICKARD of Colorado is looking at California mines.

SUPT. BLUNNER of the Murchie mine, Nevada City, Cal., has returned home from San Francisco.

P. A. FUSZ has been elected president Con. Granite Mountain Bimetallic Co., Phillipsburg, Montana.

F. BEAUDRY, a mine owner and extensive operator, Callahans, Cal., is in San Francisco en route home from Paris.

F. F. THOMAS, Supt. Gwin mine, has been elected president of the company, succeeding M. W. Belshaw, deceased.

CAPT. COUCH of Coulterville fame is again in California, looking after some dredging operations in the northern part of the State.

SURVEYOR-GENERAL GLEAVES has returned from southern California, where he recently went to investigate a number of land surveys which were declared fraudulent by a former employe of the land office. The lands in question are in Pine canyon, near Mojave, the San Gabriel forest reservation, and near Calabasus and Johannesburg. Mr. Gleaves declares that he found all of the surveys correct. It is now probable that the claimants will be given title by the Government.

MR. A. S. HALLIDIE left San Francisco this week on an extended tour through the Atlantic slope, his mission being to take notes and observe the arrangement in every way of different technical schools in Eastern cities. Upon his return he will confer with his California colleagues as to the building and arrangement of the Wilmerding Industrial School in San Francisco. It is understood that the bequest was intended, in the language of the testator, "to have a school where boys could learn a useful trade with little study and much work." The school will probably be on a lower plane than the Lick Industrial, but it is the desire of those having the matter in charge to make it of the utmost practical value.

Recent California Mining Incorporations.

Latuya Bay Gold Placer M. Co. of Alaska, San Francisco; capital stock $10,000,000, subscribed $6,303,000; O. O. Savage, T. W. Hobson, A. L. Burbank, J. N. B. Brackett, C. L. Blakemore, Jan Jose; B. Stahl, L. Meyers, New York, W. P. Veuve, Los Gatos, W. S. Gardner, Centralia.

American River Channel M. Co., San Francisco; capital stock $100,000, subscribed $60,000; J. B. Gonyean, J. L. Cooke, L. A. Larsen, N. Fife, H. A. Cooke.

El Dorado Gold Dredging Co., San Francisco; capital stock $1,000,000, subscribed $1000, I. J. Truman, Byron Jackson, L. P. Drexler, W. A. Shahan, S. N. Griffith.

Recently Declared Mining Dividends.

Lillie, Colorado, 1 cent per share, $9000; June 1.

Deadwood-Terra, South Dakota, 15 cents per share, $30,000; May 26.

Tamarack C. M. Co., Michigan, $4 per share, $200,000; payable June 30.

Victor, Colorado, 10 cents per share, $20,000; June 1.

Bix Six M. Co., Colorado, ½ cent per share, $2500; May 25.

Coast Industrial Notes.

—President Diaz recently opened the first electric road in Mexico, connecting the towns of Jalapa, Coatepec and Xico.

—The Sonoma City, Cal., Water Co. has incorporated; capital stock, $25,000, to be used for the construction of a water system at Sonoma.

—During the week Bakersfield, Cal., celebrated with appropriate ceremony the completion of the S. F. & S. J. V. Ry. from tide water to that city.

—Twelve river steamers and five barges started from Seattle, Wash., last Thursday, on a 3000-mile ocean voyage to St. Michaels, mouth of the Yukon.

—Material for the Stockton & Tuolumne County Railroad is arriving at Stockton, Cal., daily. Twenty-one carloads of rails, fish plates, etc., are now there, and twenty-five more carloads are on the road.

—Timely rains give assurance of wheat crop in Washington in excess of 20,000,000 bushels. The bulk of the grain will go to the Philippines, Japan and China. May rains also greatly aided California growing grains and fruits, and in many sections the yield will approximate that of an average year.

—The foundrymen on Puget sound have been paying for years $23 a ton for pig iron that costs in the East $9 per ton. It is locally estimated that this same class of iron can be made on Puget sound for $7 or $8 out of ore that goes 62 per cent metallic iron and low in phosphorus, silica and sulphur—a strictly pure Bessemer ore.

—A Tacoma, Wash., dispatch says: Twelve thousand men, 4000 boats and 10,000 tons of outfits are now leaving Lakes Bennett and Tagish for Dawson and vacating the immense boatyards at the lakes. The price of lumber and boats has fallen. The Canadian Government is opening a waterway between Lakes Linderman and Bennett.

—Last week the U. S. government, being in immediate need of three 12-inch manila hawsers, each 1200 feet long, to be used in towing to the Philippines, placed the order with the Tubbs Cordage Co., with the request that if possible they be finished in a week, with the result that in forty-eight hours after the receipt of the order the hawsers were made and delivered.

—Sweet wine experts have completed their figures relative to last year's output of sweet wines by the wine growers of California, with the following result: Port, 3,158,545.81 gallons; sherry, 2,372,170.33; muscat, 721,555.24; angelica, 748,686.20; tokay, 11,771,99; Malaga, 11,614.56; total season 1897-98, 7,024,344.13; season 1896-97, 4,968,339.21; season 1895-96, 6,083,919 87; season 1894-95, 4,242,600.41; season 1893-94, 4,724,595.62.

—The Northern Pacific Railway has sold thirty-five miles of steel rail to a British-American syndicate for a railway over White Pass between Skaguay and Lake Bennett. The syndicate wants bids for 50,000 ties. Three million feet of lumber have been purchased and many workmen sent north to work on the road. One of the projectors says the line will be in operation to Lake Bennett by Sept. 30th, reducing the freight rates across the pass to three cents a pound.

—A meeting of the Pacific Coast Manufacturers and Producers' Association was held in San Francisco last week to protest against the patronizing of Eastern firms by the Government when the goods can be secured on this coast. The manufacturers claim they have been discriminated against and point to the fact that the shoe factories of this coast can turn out 3000 pairs of shoes a day, at less cost than they can be shipped from the East and a great deal of time saved.

—Neither Schley nor Sampson has yet Deweyized Cervera at Satiago de Cuba, but the warlike character of the present permeating every department is illustrated by the recommendation this week of the Secretary of War to the House of Representatives for funds for harbor defense and other work in carrying on the war, aggregating many millions of dollars. Among other items was a significant brief one recommending an appropriation of $150,000 for torpedo defense of Manila harbor, Philippine Islands, to be available until expended. Other estimates submitted were for a pneumatic dynamite battery at San Francisco harbor $150,000, and for the installation of range and position finders $150,000.

—By September three large cargoes of Australian coal, aggregating 6000 tons, will be landed at Dutch Harbor and Unga island, Alaska, for the larger transportation companies. Three vessels are now loading at Newcastle, New South Wales, for the far northern ports. The British ship Ilala, Capt. Davies, will carry 2500 tons of fuel to Dutch Harbor, and the American bark Empire, Capt. Krebs, will have some 1800 tons. The American bark Palmyra, Capt. Kellar, will carry 1400 tons to Unga island for the Alaska Commercial Co. It is seldom that it is necessary to bring Australian coal to the Alaskan peninsula, but the great demand on Washington and British Columbia mines, as well as the reasonable charter rates, has brought it about this year.

—The Canadian Pacific Railroad Co. is actively pushing the extension into the Boundary, B. C., country. The mine will be 100 miles in length; the estimated cost is $3,000,000. The bids were wired to the head offices of the Canadian Pacific at Montreal. The construction may not be let before July 1. The road will connect with the C. & W. at Robson, thence up the Lower Arrow lake to Dug creek, up this stream to McCrea pass, thence down McCrea creek to Christina lake to Cascade City; along Kettle river to Grand Forks, up the North Fork and Brown's creek to Eholt pass, down Eholt creek to Boundary creek and through Greenwood, Anaconda and Boundary Falls to Midway. The line is difficult, requiring much tunneling and costly bridging.

—Since the days of Dr. Wozencraft innumerable schemes have been projected for the reclamation of portions of that part of extreme southeastern California known as "the Colorado desert." The Lower California Development Co. now proposes irrigation of that region. Estimates are that the entire system can be constructed for $300,000, and that a canal can be built large enough to carry sufficient water to irrigate 1,000,000 acres of land, it to have a natural fall of 330 feet from the point where the Colorado river is tapped to its extreme northern limit in Riverside county. The lands to be reclaimed are situated in San Diego and Riverside counties, and in the northern corner of Lower California. The center of the tract is about 100 miles from the city of San Diego. The acreage of the first-class lands reclaimable by the proposed system of canals is given at approximately 1,600,000—900,000 being in the United States.

—E. H. Coffey, secretary of the Club Internacional of San Diego, regarding the undeveloped resources of Mexico on the Pacific side, says: "The most northern and forming boundary with the United States is the State of Sonora, with a population of 154,532; to the south the State of Sinaloa, 223,684 inhabitants. The Territory of Tepic follows with 125,294 people; below, the important State of Jalisco, containing 1,159,341 inhabitants; then Colima with 69,547, Michoacan 834,923, Guerrero 332,857, Oaxaca 793,419, and, lastly, Chiapas (not counting the Japanese colony) forming the frontier State of Guatemala. South of our own State lies the territorial peninsula of Lower California with 34,668 people; a total of 4,027,756. The two first mentioned States are essentially devoted to mining industries, though agriculture is well represented. Farther south Colima is purely agricultural, while Jalisco to the north and Michoacan to the south, agricultural and mining industries are evenly divided. But the State of Guerrero, whose shipping port is Acapulco, soon to be connected with the nation's capital, is perhaps least developed, and, I have no hesitancy in saying, is destined to be the richest mining section in the republic of Mexico. In 1872, in company with a practical miner, I traveled throughout the length and breadth of the State, even to the ruins near Ometepec, lately spoken of as a recent discovery by Mr. Nevin. In this State the eastern and western Sierras unite, forming a nucleus; in their extended arms their wealth of gold, silver, copper, quicksilver and lead seems to have been concentrated. The whole country is a mass of mineral to such a degree that there are but few streams which are not impregnated with metallic taste. The fearfully broken and harsh face of the country, beseamed with rugged hills and deep chasms, has jealously guarded these treasures hitherto. The transportation has of a necessity been costly in the extreme. Within a very short time the 5000 men now working upon the railroad having concluded the task, the country will take rapid strides, and Guerrero will be the Mecca of numberless mining operators. In 1873, at the instance of the Legislature of Michoacan, the federal government resolved to create a port of entry therein—Maruata was the place to be chosen. In a personal interview with President Lerdo de Tejeda, he commissioned me to examine the locality and report to him as to the most suitable place. In accordance with his instructions, I went to the coast, at that time virgin to the foot of the drummer and the prospector. A month of solitary wandering along the shores of the ocean from the river Coahuayana to the mouth of the Mexcala, showed me that Bucerias was the only fit place—Bucerias was to the north and Maruata to the south, with a few miles intervening. The names were changed about to suit the circumstances and the spirit of the intention. In June the port was declared open and the custom house established, with a personnel of twenty-four employes. Things progressed merrily until the latter part of September, when fearful inundations flooded the surrcunding country, cutting us off from all communications by land. The poisonous emanations from the marshes and forests began their deadly work. The engineer, a Frenchman, was the first to succumb. In ten days eighteen had died; the collector, his secretary and the appraiser fied, and three, among whom I was one, were left to our fate. After an illness and a convalescence which lasted ten months, I sent in reports, according to my promise, of the products of the country. A collection of eighty-eight different varieties of wood, now in the museum of the University of California, which I forwarded in 1873, will in itself give an idea of the forest wealth of that section. Rubber and vanilla, tiger skins and deer skins form a revenue that easily support the Indian from year to year. The coffee, which was taken up as an industry in those times, has to-day developed to such a degree that, as you must be aware, companies are eagerly buying up land in all parts. One single estate, which at that time was known by the names of Montetlan, El Jabali and Sal si puedes, in the State of Colima, was entrusted to me to be sold for $15,000. It now belongs to a wealthy merchant and banker, who has set it out in coffee, and from 100,000 trees he took a crop of 183,000 pounds. There are now about 700,000 trees in. Mr. Vogel was offered $2,000,000, which was not considered."

RECENTLY was noted herein the manufacture of corn oil, with details as to its production in Chicago. It is further learned a substitute for "India rubber" is to be produced therefrom. Sulphur is one of the components, but the process and its elements are still a "trade secret." The New York Glucose Co. is conducting the present experiments.

Took the Prize at Drilling.

A long, lank, brawny-looking man, with a good-natured face and hair as red as the prairie rose, called at the Lawrence-street recruiting office this morning. He walked up to the table and accosted the officer in charge something like this:

"I want to sign my name here, so I kin help clean out the d—n Spanish."

"Have you ever drilled any?" asked the officer politely.

"Yes; I took the prize here at the festival an' cabbaged it, hands down."

"What company were you with?"

"The Cripple Creek Gold Company."

"I don't believe I understand you?"

"Well, you understand English all right, don't you?"

"Yes, but how long have you been a soldier?"

"Thunderin' tunnels, I never was a soldier?"

"But you say you have drilled?"

"That's what I said, but I thought you meant had I ever drilled with a drill in the mines. No, I never was a bluecoat, but I kin outdrill anything in the camp."

They soon understood each other, and the proud old miner passed an examination of 100 before the board of medical examiners.—Denver Times.

Commercial Paragraphs.

SAYS the Denver *Mining Record*, a large consignment of placer pipes for the Bradeck Placer Co. has arrived at Breckenridge. The consignment was from the Risdon Iron Works, San Francisco.

THE Colorado Iron Works Co. of Denver, Colo., has shipped all the machinery for the Randsburg-Santa Fe Reduction Co.'s new mill at Barstow, Cal. The total number of cars shipped was sixteen. The mill will be running in a short time. This same company, through their Salt Lake agent, A. H. Grant, has received an order from the Hanauer Smelting Co. of Salt Lake City for a 42x144-inch smelting furnace.

MR. LEWIS SEARING, consulting electrical engineer for the Denver Engineering Works, in company with Mr. Carlos Riedt of Durango, Mexico, has been making a tour through the mining camps of Colorado examining the latest improvements for the economical mining and treatment of ore. They devoted considerable time to Cripple Creek and vicinity, and before leaving Mr. Riedt placed an order for a large steam and electric power plant, and four of the new hoists manufactured by the Denver Engineering Works. This company has been very successful with their electric hoist, and this order is the result of a very careful examination of the hoists after a test run of considerable duration in Mexico.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CAR COUPLING.—Charles H. Smith, Coulterville, Cal. No. 604,505. Dated May 24, 1898. This invention relates to a device for the automatic coupling of cars and a means of disengaging the couplings without the necessity of the operator passing between the cars. It consists essentially of bars rigid with and projecting from opposing cars, said bars being on opposite sides of the longitudinal lines of the cars, diverging guides projecting from the cars, one in line with each of the bars, said guides having openings made entirely through them and the bars having knobs which pass through the openings to a point exterior to the inner end of the guides. Shafts are journaled on each car at a point behind the inner end of each guide and weighted arms on the ends of the shafts with plates on the shafts lying just behind the vertical plane of the inner ends of the guides to prevent the passage of the knobs beyond the inner ends of the guides, except by lifting the plates until the grooved portion passes the knob, when the plates will seat themselves against the open inner ends of the guides and partially close the same and secure the knobs.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING MAY 24, 1898.

604,694.—SPEAKING TUBE—T. Fales, Bridgeport, Cal.

604,380.—WAGON BRAKE—D. A. Foster, Santa Rosa, Cal.

604,526.—PIPE WRENCH—T. J. Fowler, Topaz, Cal.

604,691.—DUMP WAGON—T. B. Hopper, Yountville, Cal.

604,394.—CAN BODY BLANK—H. C. Hunter, Alameda, Cal.

604,494.—THILL COUPLING—T. E. Kendall, Walla Walla, Wash.

604,505.—CAR COUPLING—C. H. Smith, Coulterville, Cal.

604,483.—STATION INDICATOR—W. A. Turner, S. F.

28,693.—DESIGN CLOTHES PIN—F. C. Hazen, Los Angeles, Cal.

28,697.—DESIGN TELEPHONE SWITCHBOARD—W. F. Smith, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Starters for Gas Engines.

The gas engine, though a more efficient machine than the steam engine, has yet many countervailing disadvantages which have been a great hinderance to its progress and popularity. Some of these, says the *Mechanical World*, are perhaps inherent to its principle; others are not. One of the difficulties with a gas engine is that of starting. A steam engine will usually start when the crank is off the center and the cylinder is warm; the flywheel will carry the crank past the next center, and movement will continue. Not so with the gas engine. In its smaller sizes it is easy to start when in order, because the attendant can pull the flywheel round sufficiently to secure a first explosion, or even help it to the second explosion. But a man unaided is not able to start a gas engine of even moderate power. Gas engine makers have overcome this difficulty by the use of starting devices. These are various, ranging from a store of compressed air pumped up by the engine itself on previous runs, or a hand pumping device to fill the cylinder and exploding by the timing valve, to various other devices more or less simple, and suitable for engines of moderate dimensions. But for large engines there is good reason to doubt the convenience and desirableness of these self-starters, especially of that order which depends upon a stored pressure of air pumped up by the last run of the engine. It seems to the writer that gas engine makers have striven too much after originality, and rather neglected well-established and sound precedent. Until a comparatively recent date, factory engines were never provided with any starting or moving gear, other than the ordinary rack and bar. Engines in pairs were, of course, self-starting, in so far as they were as a rule arranged with cranks at 90 degrees—an old-fashioned arrangement, by the way, which has ceased to secure universal approbation, more especially with compound engines, in the steam distribution of which the 90-degree arrangement is apt to introduce an undesirable element. With the introduction of rope gearing, however, and the growth of the average pair of engines from 500 to 1000 or 1200 indicated horse power, the old barring arrangement ceased to be practicable.

If only to facilitate the putting on of the ropes when the engines were first started, or of new ropes as required, some more powerful means of revolving an engine slowly became necessary, and this was found in the small barring engine—a little pair of engines, as a rule, which were so arranged to gear into an internal toothed ring within the rim of the large rope drum that, when the main engines began to run with their own cylinders, the little engine was automatically thrown out of gear by the overrunning of the large wheel. Every maker of large steam engines applies these small engines, and a large pair of engines is not considered complete without its small barring engine. Here is the complete precedent for the starting of the large powered gas engine. A gas engine, very small compared with the size of the main engine, will be of ample power to turn the large engine slowly round so as to draw in and compress its charge of gas and air and give the first explosion. Such small engines do not even require to be of a particularly economical type. They are required to be themselves set in motion by hand, and to render this easier, the compression may be kept moderate and less dilute mixtures of gas and air be employed. A run of a minute or two is all that is required to turn the main engine to the ignition point. It is not even always necessary that the starting engine should be able to exert a power sufficient to compress the charge in the main cylinder, for the main engine, once set revolving, will have a store of flywheel energy to assist this if gas admission be delayed and the exhaust be open until the flywheel has acquired its maximum desired starting velocity.

This system of starting has the advantage that the flywheel being in motion, the stress upon the crank and other parts will not be so severe as when a first powerful explosion operates upon a piston at rest. For this reason it is well that the starting engine should not be unnecessarily small. The more quickly it is able to revolve the main engine, the less will be the stress put upon this. As with its prototype, the steam-barring engine, so the gas starter may be arranged to throw out of gear when the main engine accelerates under its own energy, and the throwing-out gear may be coupled with a shut-off valve to stop the gas supply, so that the little engine ceases to move as soon as it has fulfilled its duty.

In a central station with numerous engines in line, an obvious method of starting is by a shaft extending the length of the line of engines, and operated by an electric motor or a small gas engine, or an engine may be started by its own dynamo, which supposes, however, a source of electricity. In single engines, and on ordinary work, the small gas engine seems to present itself as the most satisfactory method to adopt. Where poor gas is employed, and mis-fires are likely to occur at starting, the use of a starter of the stored-pressure type might prove exceedingly inconvenient should the store of air be used before a start were effected. With the barring engine, the main engine can be simply kept moving until a fair start is secured. Failures to start may occur, with starting systems involving a piston. This is not likely to occur with a continuously revolving engine, as the loss of pressure is but slow, though sufficient to render ineffectual all attempts to start an engine from rest.

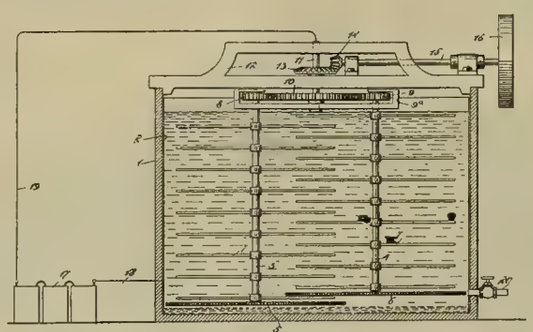
Another New Process.

J. R. Hebaus of Butte, Montana, has a new process for extraction of gold and silver, illustrated herewith.

Referring to the engraving, 1 designates a tank of any desired construction and open at its top, with a lining 2 of amalgamated copper, which constitutes the cathode. Within the tank agitators are arranged. They consist of shafts 3 4, having disks or arms 5 6 at the lower end, of insulated material. Extended radially from the shaft are arms 7, constituting the anode. The shaft 3 is provided at its upper end with a pinion 8, and the shaft 4 is provided at its upper end with a pinion 9. These pinions 8 and 9 engage with a gear wheel 10, mounted on a shaft 11, having bearings on a frame 12, mounted on the tank. Secured to the shaft 11 is a bevel gear 13, meshing with a bevel pinion 14 on a driving shaft 15, to which a drive wheel 16 is attached. The shafts 3 and 4 have bearing at their upper ends in a bar 9ª, mounted to turn on the lower end of the shaft 11.

The cathode or amalgamated copper lining 2 is attached to an electric battery 17, by means of which a wire 18 and the anodes consisting of the shafts 3 and 4 and the arms thereon are connected by a wire 19.

The tank is charged with the required quantity of water, the agitators set in rotary motion. The pulverized ore is then gradually introduced, together with salt, caustic soda and lime in unequal proportions. Ores which carry but little silver do not require salt. Ores which carry silver in quantity require one pound of salt to the ounce of silver. In proportion to one pound of caustic soda is used sixteen pounds of lime. The charge is then ready to receive the chemical solution, which consists of from one-fourth to three-fourths per cent of cyanide of potassium. At the time the chemical solution is introduced the electric current is turned on. Diluted bromine and sodium dioxide are added during the operation, care being taken to have the potassium cyanide in excess and not to add the bromine and sodium dioxide faster than the cyanogen is set free. After the ore is treated from two to three hours the ore and solution are drawn off through the valve-controlled outlet 20, then drawn off into another vat to settle, when the solution is removed from the vessel and used over again, with the addition of a new supply of cyanide.



NEW PROCESS FOR EXTRACTION OF GOLD AND SILVER.

Invention vs. War.

The development of the art of war from this time on will be a battle of inventors. Even our last war was productive of engines of war and destruction which exceeded in number those of the entire world up to that date. The next conflict the chemical patents will vie with the physical. An official is reported to have said, regarding the Maine disaster: "It took just about three men to accomplish the destruction of that gigantic fighting machine. They could, with a large quantity of nitro-glycerine, or some such high explosive packed in bags impervious to water, have accomplished it. By placing in each bag just enough cork to give the whole the approximate specific gravity of the water, dragging one of the bags, a good swimmer could have approached within a short distance of the ship, then dived to escape observation, and come up under the safe shelter of the side of the vessel. To attach the bags to the bottom of the ship would be easy, and a chemical time fuse that would burn under water could be ignited readily enough and time enough for easy escape of the operator." When two or three men with a few dollars' worth of explosives can approach and destroy in a few moments a $5,000,000 ship of war, it would seem to indicate that the real fighting of the future—on the water at least—will be done with smaller and less unwieldy craft.

The advantage of high explosives is that only a little power is required to convey them to the place of action, and from experience already had with their destructiveness, it is fair to presume that should a half dozen hostile vessels of war succeed in entering any of our harbors, they would quickly be annihilated, not, perhaps, by our own warships or forts, but by a small group of courageous men with infernal machines.

Nations vie with each other in building the largest warship or the largest gun, the utility of which is based upon gunpowder, yet gunpowder is practically out of date. It has given away long since in mechanical operations, which will, in the near future, be the arbiters in the offensive and defensive operations of nations. The cost of one modern warship will build fifty effective torpedo boats. Whatever the result of the present complications, the stimulus to invention in war craft will, we think, tend to smaller size, with an increase in effectiveness.

Hubernite in Arizona.

A variety of wolframite called "hubernite," a combination of tungsten and manganese, with a little iron oxide, is discovered in quartz veins traversing a coarse-grained granite at Russellville, six miles north of Dragoon, Summit Station, on the S. P. road in Cochise Co., Arizona. It is mixed with white quartz, from which it can be readily separated by ore dressing machinery and other methods. It is nearly seven and a half times as heavy as an equal bulk of water. It is a comparatively rare mineral, but occurs in Cornwall, in Germany, and lately has been imported from Australia. The manufacturers of steel take a great interest in any discovery of the mineral and are willing to pay a good price for it when it is pure and high grade. It should contain at least 10 per cent of tungstic acid, and therefore must of necessity be well purified and freed from all quartz and gangue.

This ore is not in one continuous body. It occurs in bunches at intervals in the quartz. The quantity has got to be determined by sinking shafts and by cutting exploring pits and trenches. The value at the market ranges from $60 to $100 per ton.

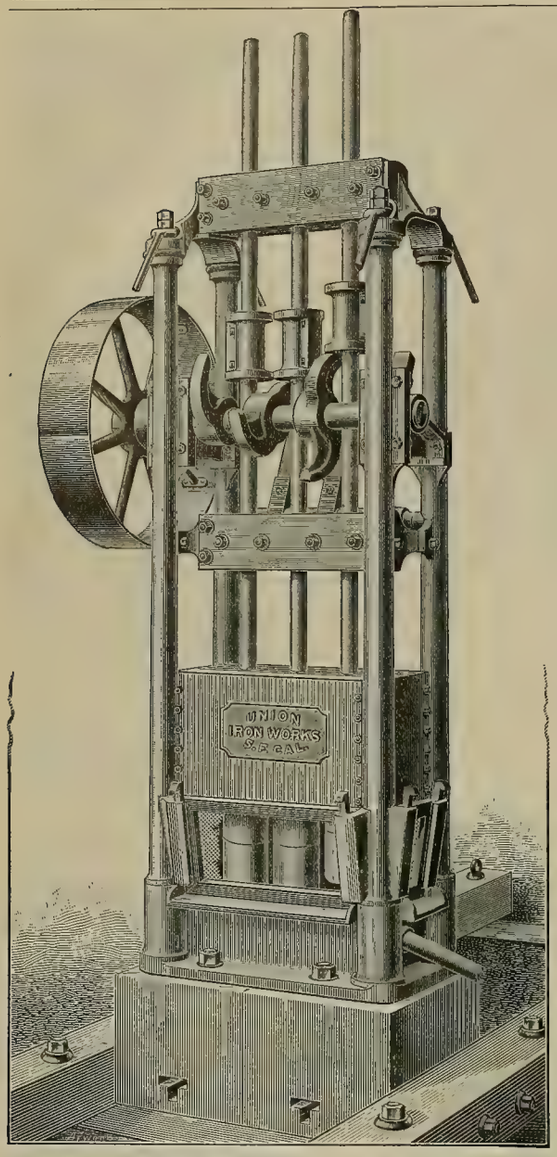
The Preparation of Chromium.

Aschermann describes a new method of preparing chromium in the electric furnace. A gastight steel furnace is used in connection with a movable electrode. A graphite crucible is placed in the furnace and in it are placed oxide of chromium and sulphide of antimony, in the proportion of 10 in 23. After the furnace is closed, a comparatively light current, say of 20 to 25 amperes, is passed through the material to be melted. A reaction takes place, attended with development of heat.

The resulting mass consists of a regulus of a chromium-antimony alloy, while the upper part of the crucible has an amorphous mass of antimony oxide, sulphide, etc., adhering to the walls. Repeated melting of the regulus removes every trace of antimony, although it is easier to powder and roast this regulus at white heat, when the antimony is driven off. Chromium has the property of dissolving a considerable proportion of carbon, which separates out as graphite again upon cooling. At about 3600° F. chromium volatilizes.

T. C. TRIPLER of New York is the reputed discoverer of a new process for liquefying air at a greatly reduced cost. The first scientists to produce this product did so at a cost of $2500 a quart. By the new process a 40 H. P. engine is utilized and the product is two to three gallons an hour. The operation consists in compressing air three times in succession to 60, 300 and 2000 pounds to the square inch, and cooling it each time by passing cold water over the pipe in which it is contained. The air is then allowed to escape in a fine jet from the end of the pipe in which it is under pressure, and allowed to expand. It passes along back, over and around the pipe through which it has come. This produces an intense cooling of the gas in the inner pipe. Repeated three times over, this expansion cools the air below the point of liquefaction; it ceases to be a gas and becomes a liquid. As soon as it is released it begins to boil violently until the air about it is raised to the same temperature. Some scientists are disposed to regard the discovery as important.

IT is stated that the setting of plaster of Paris is very much accelerated if the plaster is mixed with a 5 per cent solution of common salt—which may be roughly made by adding a tablespoonful of salt to a pint of water.



Union Iron Works,

222 MARKET STREET,

SAN FRANCISCO, CAL.

This

Three-Stamp Iron Frame Battery

WAS MADE BY THE

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The stamps weigh 350 lbs.

The total weight of the battery is 5000 lbs.

The weight of the heaviest piece is 1300 lbs.

Capacity, five tons per day.

THE COLORADO IRON WORKS CO., DENVER, COLO.

Established 1860. ✦ ENGINEERS AND MANUFACTURERS OF **Ore Milling and Smelting Equipments.**

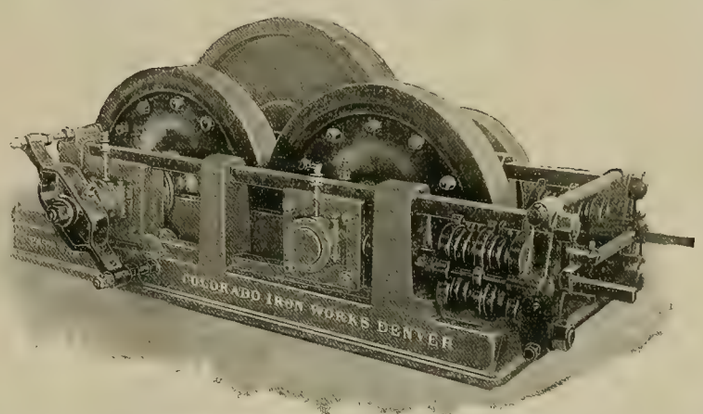
We beg to call attention to our

High Speed Special Rolls

as being the most efficient and the most economical machine for fine dry crushing ever placed upon the market. The rolls having

NARROW FACES and LARGE DIAMETERS

can be fed evenly over the whole width of faces with certainty, and hence the faces or crushing surfaces are easily kept true. Descriptive pamphlet on application.



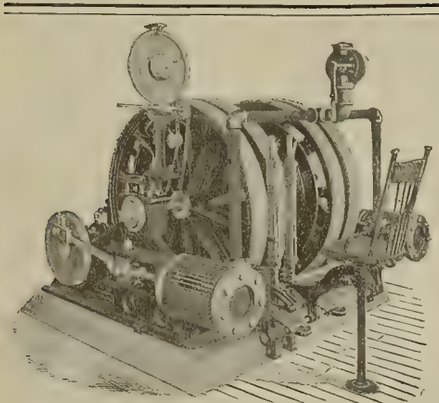
HIGH SPEED SPECIAL ROLLS, WITHOUT HOUSING.

Double rope tramways are acknowledged to be superior to those of the single rope type, and any one contemplating the erection of a tramway should investigate the merits of the . . .

THE ONLY AUTOMATIC TRAMWAY BUILT.

FINLAYSON PATENT AUTOMATIC WIRE ROPE TRAMWAY.

In this system the cost of transportation is brought below any figure heretofore reached. Its tonnage capacity is unsurpassed. Further information on application.



$25,000,000. **$25,000,000.**

During the past 15 months there has been brought to the surface by our hoisting engines ore of sufficient value to

Purchase Five Powerful Battle Ships.

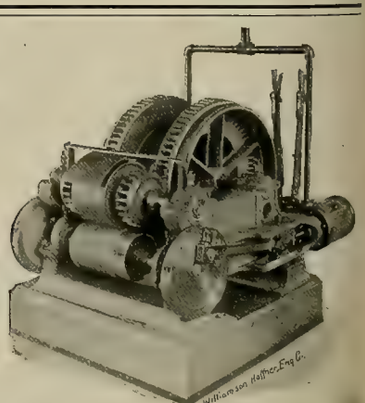
If we have war you will necessarily want to

Purchase a Powerful Bolthoff Hoist

and increase the output of GOLD and SILVER which ARE THE SINEWS OF WAR.

WRITE FOR CIRCULARS AND PRICES.

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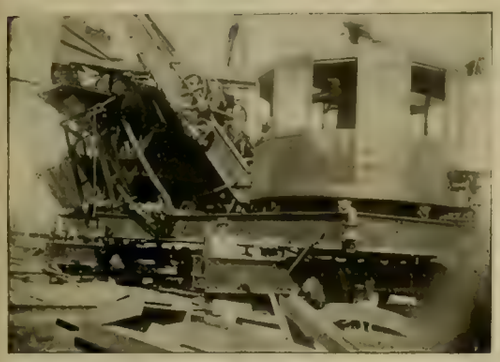


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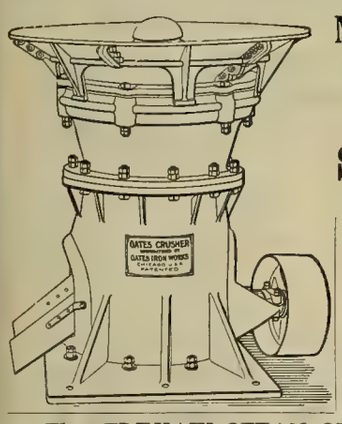
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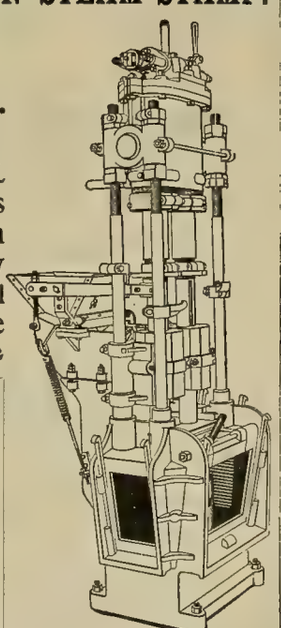
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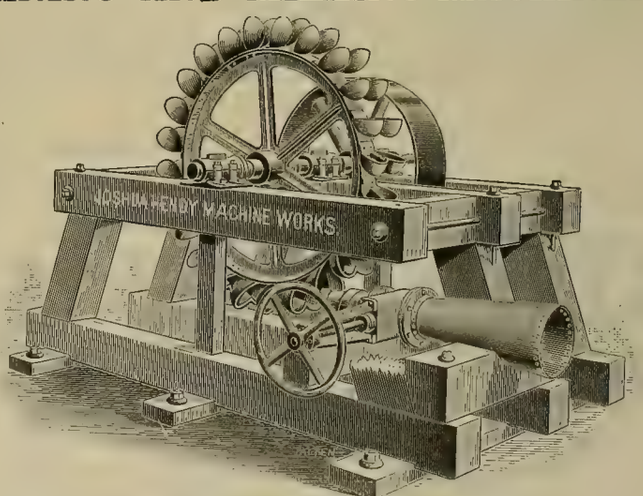
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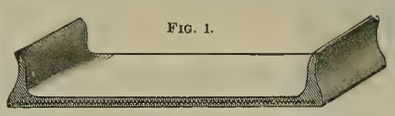


FIG. 1.

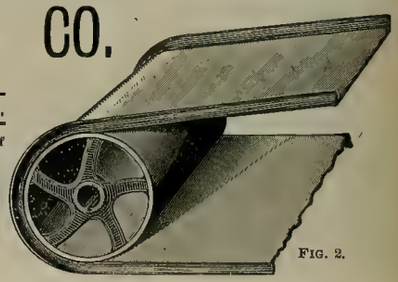


FIG. 2.

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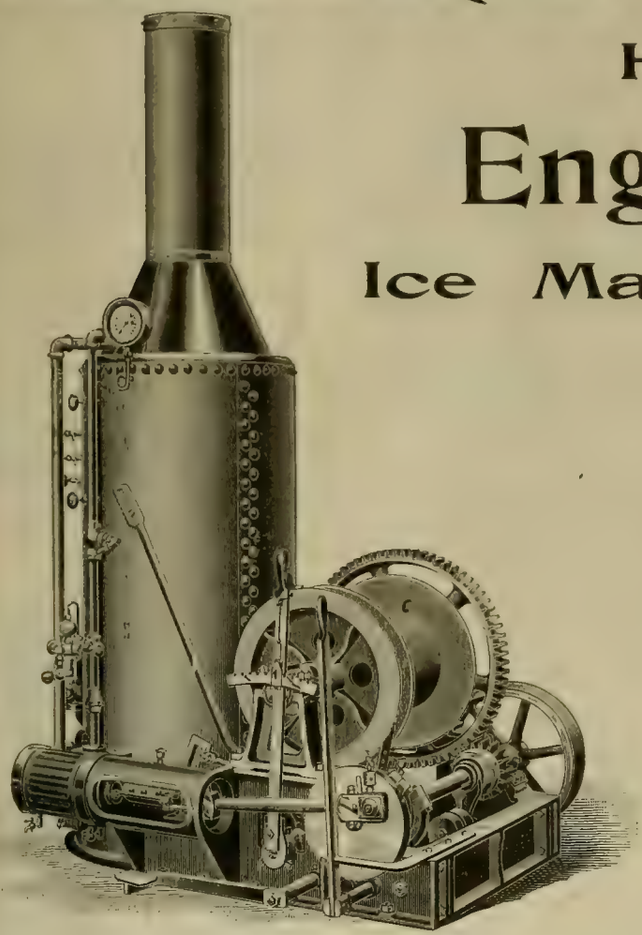
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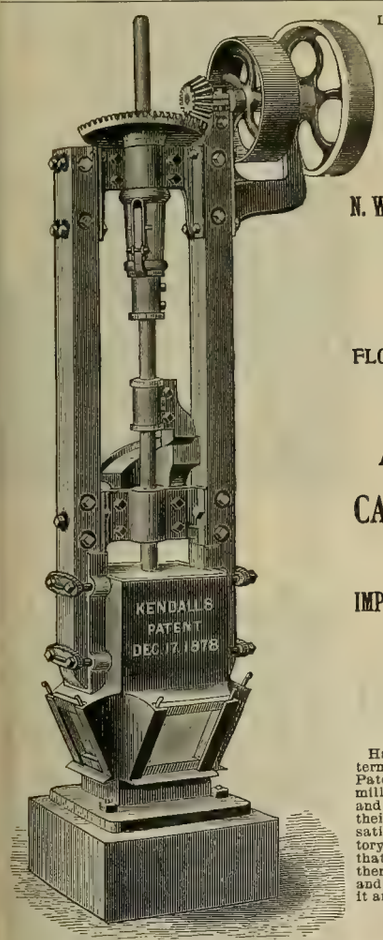
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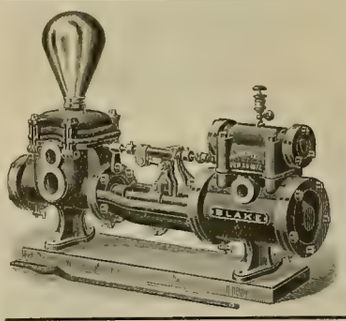
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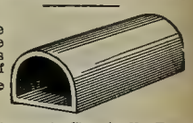


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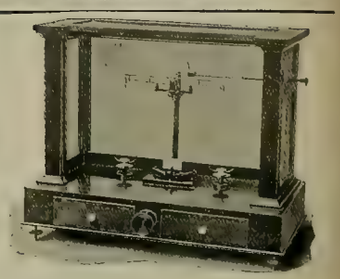
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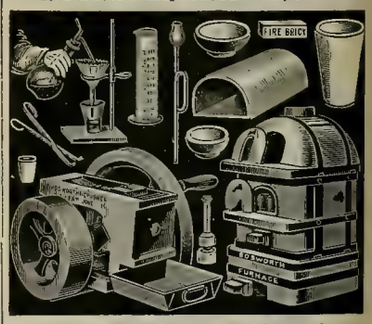


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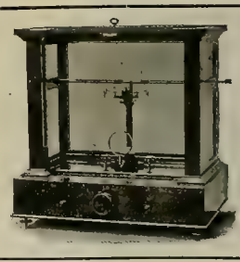


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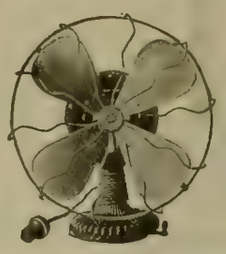
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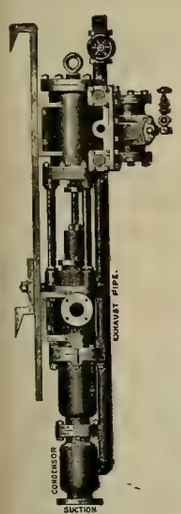
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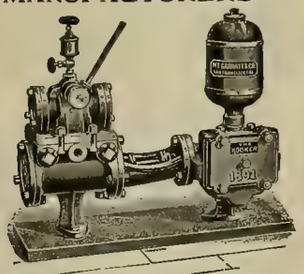
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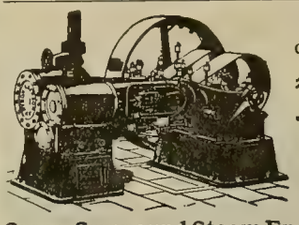
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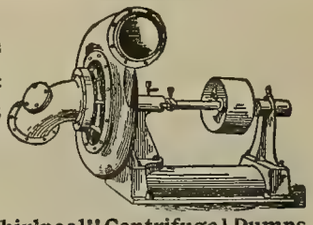
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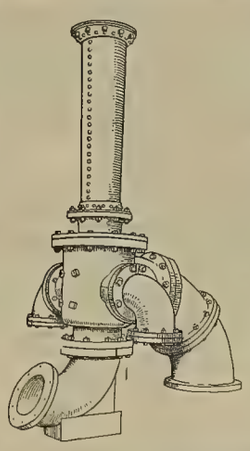
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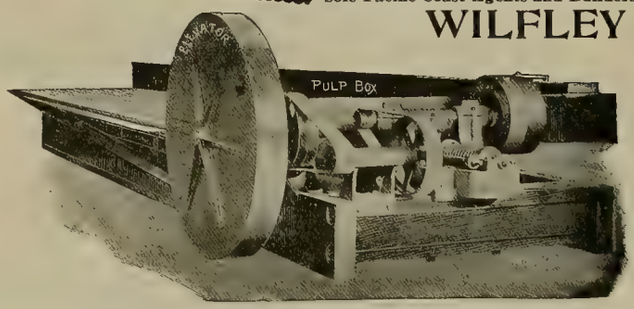
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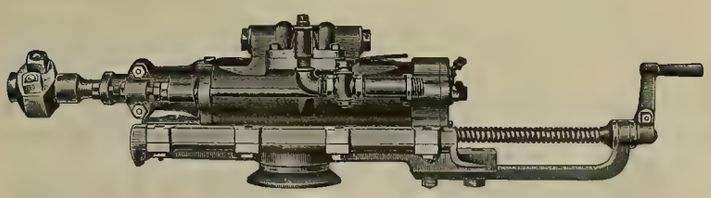
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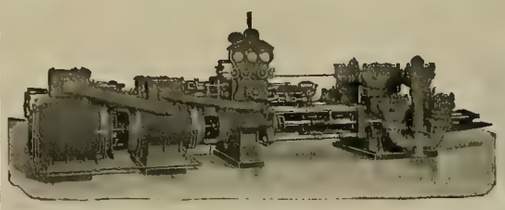
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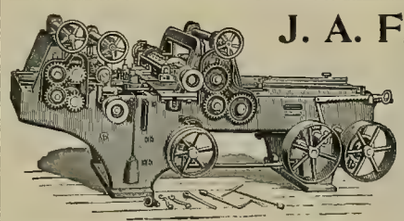
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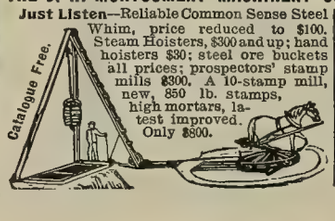
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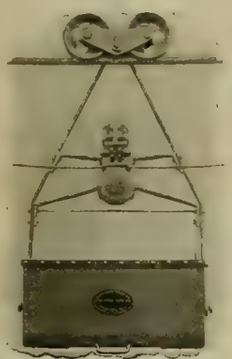
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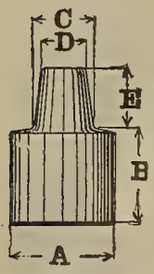


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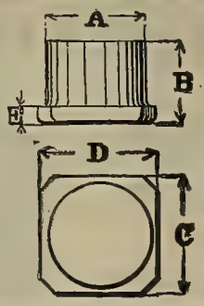
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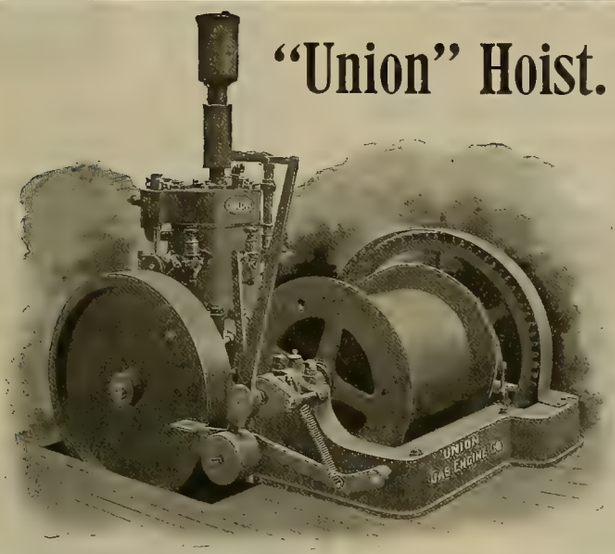
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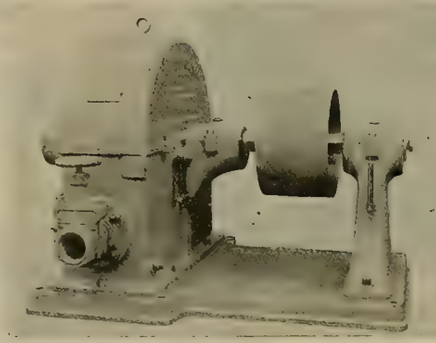
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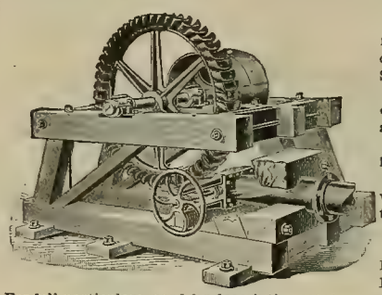
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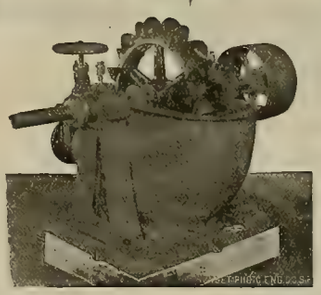
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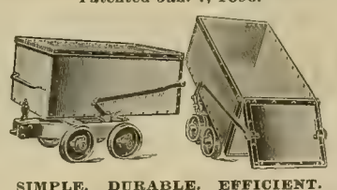
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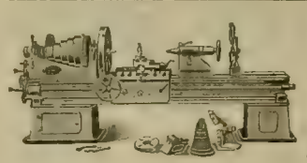
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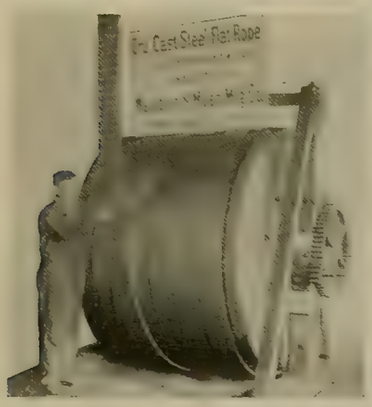
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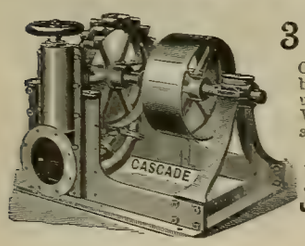
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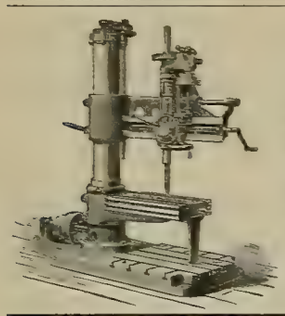


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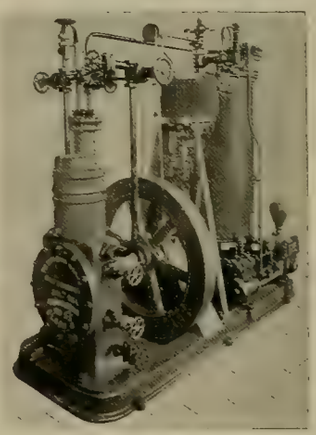
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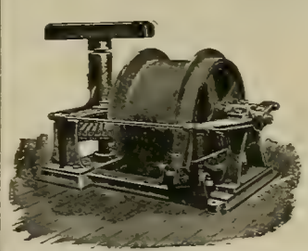
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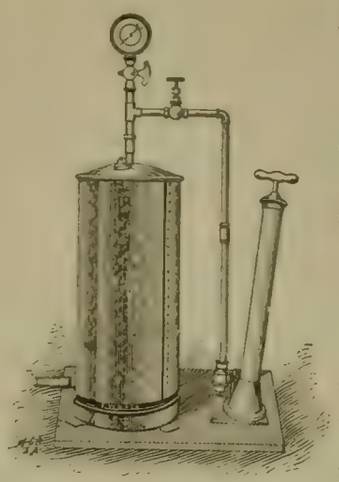
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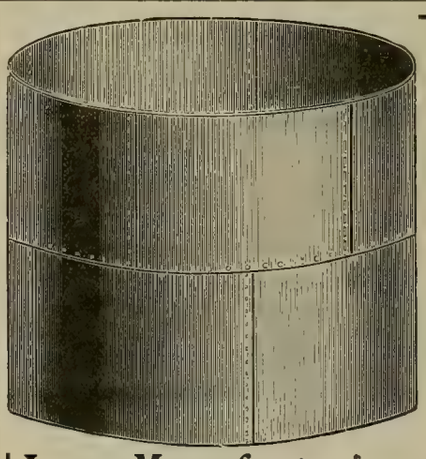
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Market Reports.

The Markets.

SAN FRANCISCO, June 2, 1898.

Antimony is quoted local at 10c; Babbitt metal 16.18@20c; in general, metals and chemicals are unchanged. Quicksilver is at last week's quotations, $42.50 local. Copper is quoted all round 12c. A San Francisco copper circular says:

The production of copper in 1897 has exceeded any previous year known in the world's history, and were it not that the consumption has equally increased we would have seen lower prices than ordinarily. As it is, we entered the new year 1898 with a stock on hand about the same as that time a year ago. For the first six months the production in the United States was very large, and the demand from Europe kept increasing, so that our exports were much greater than at any previous period. During the latter six months the European demand slackened by reason of the great strike of engineers in England, while the trade of the United States improved so much as to utilize the larger production and leave us at the end of the year with comparatively small stock.

Prices kept very regular accordingly, beginning in January with 11¾c per lb for Lake; an advance was made to 12c, the highest price. This, however, did not continue long, and presently the price receded gradually to 10¾c and improved in December to 11c.

The production of the United States is given by the statistics of the producers, as follows:

	Long Tons of 2240 lbs.
Montana, nearly	100,000
Michigan, Lake Superior	65,000
Arizona	36,000
California, Utah, Idaho, Colorado and New Mexico	12,000
Total	213,000

The exports were 128,269 long tons—over 60 per cent of production, showing a domestic consumption of nearly 85,000 tons—a wonderful increase over four years ago.

This increased production is mainly due to the expansion of electric power, although there has also been a great improvement from uses of bronze in house building, etc.

California has for many years been backward in copper production, owing to heavy cost of transportation, but this past year we have increased at a greater ratio, from the opening up of many old mines that had been lying dormant since the high values of 1864-67. Notably among our products is the Iron Mountain mine of Shasta county, which was purchased by English capitalists and has been worked during the past year on a large scale by smelting operations. In many other sections ore has been produced in increased quantities, and if we only had cheaper fuel for smelting, transportation and power, California would show to the front as a considerable producer of copper. Already one hears of inquiries for copper mines, and some few have been sold, so that there is a reason to expect that 1898 will see a larger production than ever before.

Prices are not likely to improve much, as all over the country it is known that good mines exist only awaiting capital to open them up and improve the facilities for working—by building new roads, railroads, and cheapening cost of fuel and transportation.

The movement of ores, mattes and base metal is given as follows in short tons:

	Short tons of 2000 lbs.
Matte and base metal from California	10,790
Ores from Nevada and Utah	12,616
Ores from Arizona and New Mexico	37,614
Matte and base metal from New Mexico	28,354

In chrome ores there has been little handled owing to the withdrawal of the import duty on same, thereby allowing foreign chrome ores to be imported at a lower rate than California could compete with, with its heavy freight charges to overcome. Manganese, magnesite, and antimony ores have been low and the production here is small. Nickel and cobalt have also shown a decreased production, while lead ores show an improvement, owing to increased values.

Of copper, New York advices are that the copper market is bare of any new feature of great significance, and prices show little if any quotable change. Lake is 12c, with market dull but steady. There is information that the Calumet & Hecla has been shipping copper quite freely since navigation opened a few weeks ago. Exports of this brand have also gone forward lately, although they are small compared with shipments by other exporters. For some time the Calumet & Hecla has been supplying the bulk of the home trade and exporting not more than about a quarter of its production. The Bigelow-Lewisohn group of mines send abroad the large percentage of their output, and since Jan. 1 have shipped to Europe about 35,000,000 lbs. of copper. This assures large earnings for these properties.

Silver attracts some attention. There was a slight general advance in May, caused mainly by Spanish purchases, regarding which *Bradstreet's* says:

Although the influence is necessarily a temporary one, purchases of silver in London by the Spanish government have, it seems, been the chief supporting element in connection with the price of that metal for the past fortnight and possibly for some time previous. The strength of the silver market has been duly noted and was mainly ascribed to renewed Indian purchases caused by heavier shipments of grain from that country, stronger rates for exchange on Calcutta and Bombay and a corresponding disposition on the part of the Indian banks to remit silver. It now seems, however, that this influence has been supplemented by the action of the Spanish government and the Bank of Spain in their efforts to prevent an absolute break-down and suspension of specie payments by the institution in question. The latest advices from Madrid, via London, indicate that the earlier accounts of the run upon Spain's national institution and the drain of its silver holdings were by no means exaggerated. On April 16, immediately before the declaration of war with the United States, it held silver to the amount of 256,980,000 pesetas, or in round figures $52,000,000. At the end of the first week in May the amount was reduced to 146,513,000 pesetas, there having been in the preceding three weeks a reduction of no less than 110,000,000 pesetas, or $22,000,000.

All subsequent indications and advices point to the continuance of the drain, while the proposal of the Spanish ministry to issue a large additional amount of Bank of Spain notes renders it extremely probable that holders of the notes would convert them into silver as long as the bank continued such payments, thereby obliging the institution to go into the silver market on a large scale. The London financial papers, commenting upon the matter, point out that at the latest accounts the Bank of Spain held in gold an amount of 245,338,000 pesetas, or around $50,000,000. By buying silver at the present time it can obtain nearly 2½ silver pesetas for 1 of gold, while the conversion of gold into silver would yield a large seigniorage. It was therefore considered extremely probable a fortnight ago that the financial position of Spain and the methods adopted by the government and the Bank of Spain, irrespective of their effects upon the general financial condition of the country and the gold premium at Madrid, would lead to heavy buying of silver for Spanish account. This has apparently been fully verified by the actual result and has its effect in the sustained higher level which the silver market has exhibited since the beginning of the war. The enemy has, in short, been making a higher market price for an American product.

The interesting story that Gen. Merritt had bought 250,000 Mexican dollars in this city to take to the Philippines is denied.

To-day's quotations on silver were: New York, 59⅝; London, 27⅛d; locally, 59⅜.

Secretary Gage is pushing the coinage of gold bullion at both Philadelphia and San Francisco. Within the past few weeks $30,000,000 in gold bullion has been shipped from New York to the Philadelphia mint. At the San Francisco mint coin is being turned out, though the supply of bullion there is small, not being over $5,000,000.

The Sydney steamer yesterday brought £575,550, which will be received at the Mint, making a little over $2,800,000. Since August 22nd, '97, Australia has sent to San Francisco gold aggregating $22,484,250.

On account of the heavy payments incident to the Philippine expedition, it may be necessary to send gold bullion from the east to San Francisco. Orders have been issued to send 1,000,000 ounces of silver bullion from Philadelphia to New Orleans to be coined into standard silver dollars.

Mining Share Market.

SAN FRANCISCO, June 2, 1898.

Gold Hill stocks were in favor this week, drainage plans being given consideration. Hale & Norcross and Sierra Nevada also showed a little strength. Heaviness characterized the general tone of the market, which was in control of the chippers.

Local mining enterprises paid May dividends aggregating $99,475; in May, '97, the aggregate was $77,025.

San Francisco Stock Board Sales.

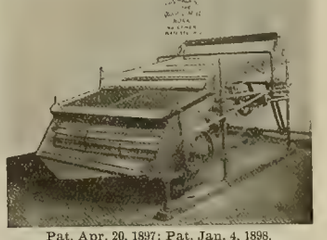
SAN FRANCISCO, June 2, 1898.

9:30 A. M. SESSION.

200 Andes	09	100 Potosi	21
100 Challenge	25	300 Sierra Nevada	66
100 Con Cal & Va	49	150 Standard	1.55
200 Gould & Curry	21	350 Union	11
500 Mexican	21		

SECOND SESSION—2:30 P. M.

100 Best & Belcher	27	400 Potosi	19
100 Con Cal & Va	48	100 Crown Point	13
200 Savage	10	800 Sierra Nevada	60
300 Chollar	15		



Pat. Apr. 20, 1897; Pat. Jan. 4, 1898.

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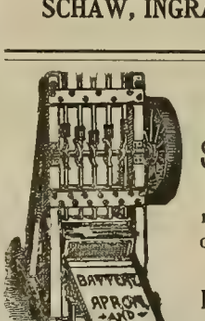
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Assessment Notices.

RED CAP MINING COMPANY. LOCATION of principal place of business, San Francisco, California; location of works, Red Cap Creek, Humboldt County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of April, 1898, an assessment (No. 3) of two dollars per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, 125 Beale St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 27th day of June, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. H. MARTIN, Secretary.

Office—125 Beale St., San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 10th day of May, 1898, an assessment (No. 1) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 213 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 5th day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson St., San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 5) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 916 Market street, Room 57, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of June, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 23rd day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—No. 916 Market street, Room 57, San Francisco, California.

LEON GOLD MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, near Winchester, Riverside County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 1) of 1½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

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Notice is hereby given that the regular annual meeting of the NATIONAL CONSOLIDATED MINING COMPANY will be held at the office of the company, 916 Market Street, Rooms 56 and 57, in San Francisco, on MONDAY, the 6th day of June, 1898, at 3 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may properly come before the meeting.

By order of the Board of Directors.

G. W. FLEISSNER, Secretary.

San Francisco, May 12th, 1898.

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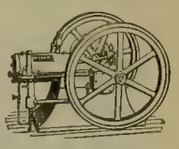
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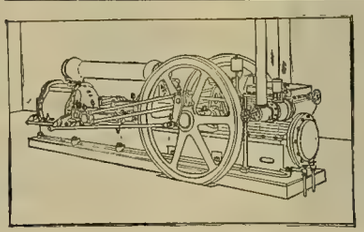
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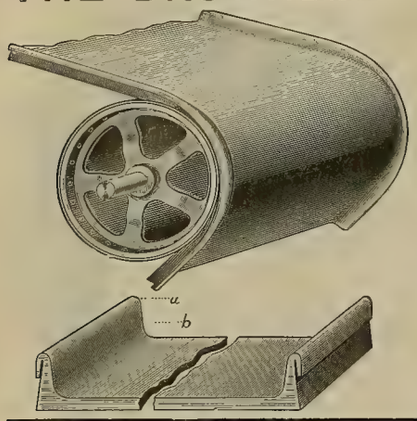
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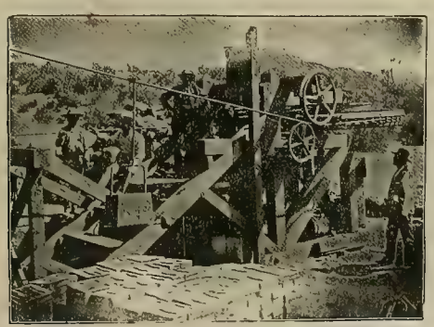
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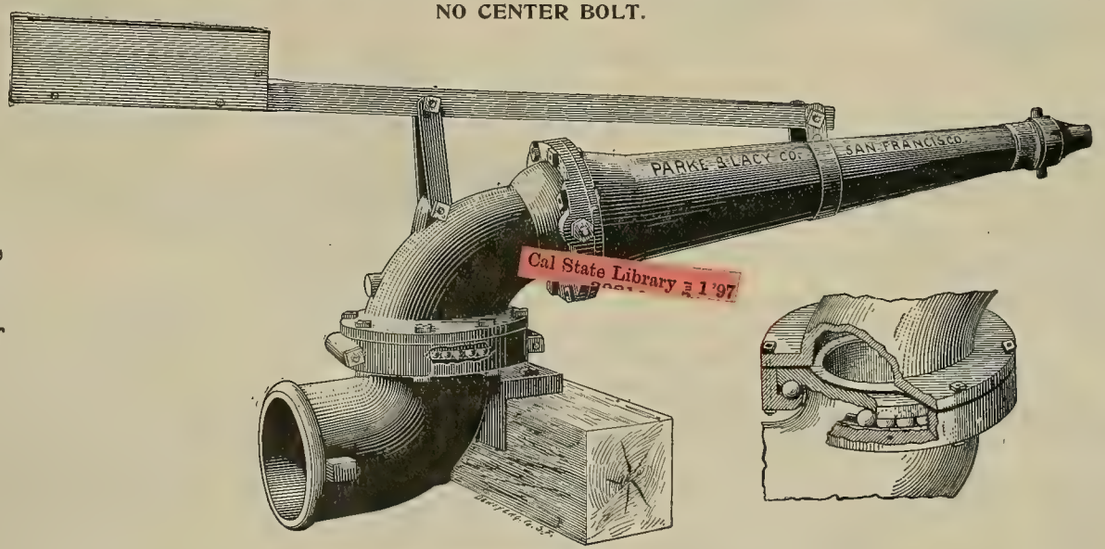
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No. 1979.—VOLUME LXXVI. Number 24. SAN FRANCISCO, SATURDAY, JUNE 11, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

CALIFORNIA

Two Important Mining Decisions.

Since last week's issue, the United States Supreme Court has made final adjudication of two mining cases which are of more than local importance, the question of mining law at issue being of interest to mining men in every part of the nation, hence the matter merits extended notice. The first case was that of A. Walrath vs. the Champion Gold Mining Co., of Nevada Co., Cal., and involved legal questions which it is believed have not heretofore been decided by the court of last resort as to the rights of owners of mining claims held under patents granted under the Act of 1866 as to veins other than the one upon which the patent was granted, as well as to the construction of end lines. Following is a brief history of this case:

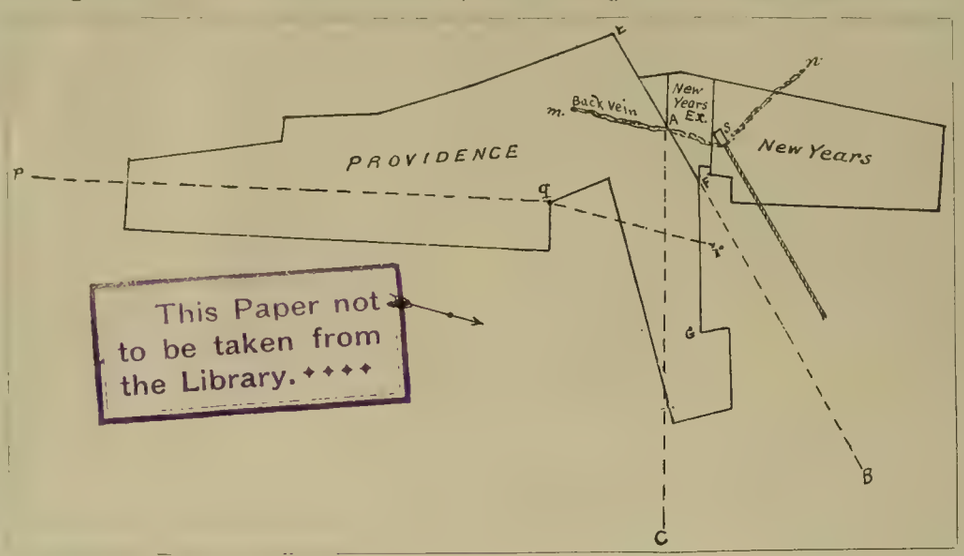
A. Walrath was the owner of the Providence mine; the defendant, Champion Mining Co., the owner of the New Years and New Years Ex. claims.

In the year 1870 a patent was granted by the United States to the Providence lode, shown on the diagram at *P*, *Q*, *R*, (Cut No. 1); also to the piece of surface ground marked Providence. On this vein an incline shaft was sunk 1500 feet deep, and extensive mining operations carried on. From this shaft two crosscuts were run 600 feet to the west, and another vein opened up and worked by the Providence Mining Co., this back vein having its apex on the line *M*, *S*, *N*.

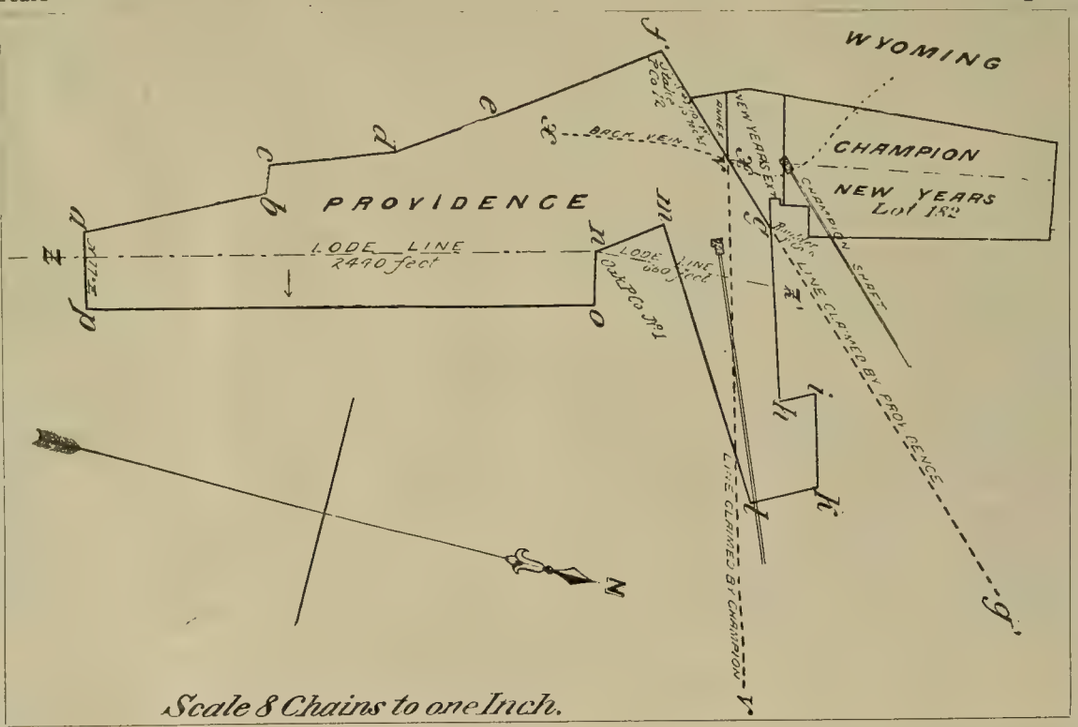
On this vein, at the point *S*, the Champion Mining Co. sunk a shaft 1000 feet deep on the pitch, extended its works and took out ore south of the line *E–B*.

The plaintiff asked for an injunction to restrain defendant from working south of the line *E–B*, and for damages for ore removed south of said line, placing damages at $300,000.

The contentions of plaintiff were that whereas the Act of 1866 only granted to the Providence claim the lode *P*, *Q*, *R*., that the mining act of Congress of May 10, 1872, gave it the additional grant of all other veins, the apexes of which were situated within the surface lines of said claim, with the right to follow the same on their dip to any depth, and that the line *E. F.*, which is crossed by the apex of said vein, is the end line on said vein, and that the right to follow said vein on its dip and strike is limited by a plane through said line *E–F* and its continuation.



CUT NO. 1.



CUT NO. 2.—(See next page.)

It was further claimed that a location made by the Champion Mining Co. in the year 1884, containing a clause of abandonment south of the line *E–F*, made said line a compromise line, and that defendant was debarred from asserting any rights south of said line. The defendant contended that the line *E–F* is a line which limits the claim of the Providence mine to said vein on its strike, but that the rights on the dip are limited by a plane passed through the point *A*. and parallel with the line *F–G*., being the line crossed by the patented lode *P*, *Q*, *R*, That the claimed abandonment was not of such a nature as to make the plaintiff a party to same, and that when defendant obtained from the land office the receiver's receipt for a patent, that it gave a new title, which barred any claimed compromise.

The portion of the mine in dispute was that portion of the back vein included in the lines *A–B* and *A–C*. The peculiarity of this action relates to the numerous irregular shaped pieces of surface ground which were patented to mine owners under the Act of 1866 and the application of the Act of 1872 and the decisions of the courts thereunder; the difference between the two acts being that under the law of 1866 a patent was granted for a number of feet of a vein, with a piece of ground for working purposes, which could be taken in any shape. Under the act of 1872 a piece of ground is patented, which is practically supposed to be a parallelogram containing a vein.

The case was tried by U. S. Circuit Judge Hawley of Nevada, sitting for Judge McKenna, in San Francisco in May, '94, and to him submitted for decision on Aug. 13, '94. Judge Hawley rendered his decision in favor of defendant, as follows:

This action is of the same character as the Con. Wyoming-Champion, just decided, and may be said to be a companion case, as it involves the title to a small segment of mining ground of the "contact" vein situate farther south.

The Providence mine was located in July, 1857, in conformity with the local rules and regulations of the miners in the mining district where the claim is located. On the 28th of April, 1871, a patent was obtained from the Government of the United States for 3100 linear feet of the Providence lode and for certain surface ground of irregular shape and form. This patent was is sued under the provisions of the Act of Congress of July, 1866, and the grant was "restricted to one vein, ledge or lode," and to the surface ground particularly described by metes and bounds.

Complainant derives his title to the Providence lode under said patent, as a cotenant.

The respondent is the owner of the mining claims and ground known as the "New Years" and "New Years Extension." Its right to these claims was acquired subsequent to the Act of Congress of 1872, and is evidenced by a receipt and certificate of purchase from the United States Land Office, which is the equivalent of a patent. The original location of the New Years Extension on

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San Francisco, June 11, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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its southeasterly side overlapped upon the surface of the Providence mine, in the form of a triangle.

In 1884, the owners of the Providence objected to this overlap upon their patented ground, and the result of this objection was that the respondent caused a relocation to be made by its superintendent, abandoning such portions of the lode and surface ground as were within the patented surface lines of the Providence. The notice of location of the New Years Extension, omitting certain portions, reads as follows: "The lode line of this claim, as originally located and which I hereby relocate, is described as follows: Commencing at a point on the northerly bank of Deer creek, which point is 80 feet S. 11 deg. 45 minutes east of the mouth of the New Years tunnel, and running thence along the line of the lode towards the N. E corner of the Providence mill, about S. 46 deg. 15 minutes east, 3.0 feet, more or less, to a point and stake on the northerly line of the Providence mine patented, designated as mineral lot No. 40 for the south end of said lode line. * * * And whereas, part of this claim, as originally described and as hereby relocated, conflicts with the rights granted by the letters patent of said Providence mine. * * * Now, therefore, so much of this claim, both for lode and surface ground, as originally designated, conflicted or now conflicts with any portion of the surface or lode claims or rights granted by said patent is and are hereby abandoned. Which portion of this claim so abandoned is described as follows: All that portion of the above described New Years Extension claim for surface and lode, which lies south of the northern boundary of said Providence mine which runs north 43 deg. 10 min. east across the southeastern corner of this claim."

Numerous maps, diagrams and models were offered by the respective parties. The diagram (cut No. 2, on preceding page) is deemed sufficient to illustrate and explain the contention of the respective parties:

The lines *a, b, c, d, e, f, g, h, i, k, l, m, n, o, p* represent the lines described in the patent of the Providence. The lode line from *z* to *z'* running in a northerly and southerly direction represents the Providence lode described in the patent. This lode is in granite and is called the "granite lode;" its dip is to the east. The lode delineated on the diagram and marked *x—x'* is a separate and independent lode from the granite, and is called by complainant a "back vein," and by respondent the "contact" vein, between slate and granite walls. This lode is the same as was designated in the Con. Wyoming vs. Champion, as the Ural or "contact" vein. It will be noticed that in its course upon its strike it comes into the New Years claim across the Ural side line—marked Wyoming in the diagram—and passes through the New Years in a southerly direction to the northerly line of the New Years Extension, when it changes its direction to a southerly course and extends through the New Years Extension and across the line *f–g* of the Providence surface line and extends through the Providence ground to the point *x*, as delineated on the diagram. Its direction beyond that point has not been ascertained and is entirely problematical, and, as I think, is wholly immaterial. If it continues in the same direction it would cross the line of the Providence between *d* and *f* near the point *e*; but for aught that appears in the evidence it may extend through the Providence ground and cross the line *a–p*. Its dip, like the Providence, is to the east.

The Providence lode as patented extends northerly about 30 feet across and beyond the line *g–h*, and about —— feet southerly beyond the south line *a–p* of the surface location. No portion of the surface ground is in dispute. There is no controversy with reference to the Providence lode. The only controversy between the parties is in relation to the "contact" or "back" vein. What portion of this vein in its downward course is complainant entitled to? Which line is the northerly end line of the Providence ground through which the vertical plane is to be drawn downward with reference to the contact vein?

Complainant claims that the line *f–g* on the diagram is the northerly line of the Providence with reference to this lode, and that this line should be extended to *g'*, and so on indefinitely downward. Respondent claims that the line should be drawn from the point where the lode crosses the southerly line of the New Years Extension, or annex covering the same ground from *v* to *v'*, marked on the diagram as the "line claimed by Champion."

The case was argued ingeniously, with much zeal, force and ability upon both sides, and numerous questions of both law and fact were earnestly pressed upon the attention of the court in favor of the respective contentions. Many of the points thus presented were—as in the Con. Wyoming case—novel and new, and all of them were exceedingly interesting and have received careful consideration. I shall content myself, however, by stating what is believed to be the proper construction of the Statutes of the United States and announce my conclusions upon the questions involved without attempting to discuss all the legal points advanced by counsel.

As there is no dispute between the parties as to the right of complainant to the Providence lode, it is unnecessary to discuss that question except so far as it may tend to illustrate or explain the principle that is to be applied to his right to the contact vein. The Providence lode was located, as before stated, prior to the Act of 1866, under the rules, regulations and customs of the miners in the district where the mining claim is situated. The locators were only required to designate the lode in their notice of location. The lode was the principal thing. The surface ground was a mere incident thereto for the convenient working thereof. The notice of location designated the number of feet that was claimed upon the lode, and the locators were entitled to that number of feet, if allowed by local rules, in whatever direction the lode run, and to all its dips, spurs, angles and variations. The subsequent Acts of Congress did not interfere with these rights, but were in all respects confirmatory thereof. The Eureka case, 4 Saw., 323; Wilhelm vs. Sylvester, 35 Pac. Rep., 997.

The Act of 1866 provided a method whereby the owners of mining claims, located prior to the passage of the Act, who had complied with these local customs, rules and regulations might, upon certain conditions, receive a patent therefor from the Government of the United States. Parties applying for patents were required, among other things, to "file in the local land office a diagram of the same so extended laterally or otherwise as to conform to the local laws, customs and rules of miners, and to enter such tract and receive a patent therefor," etc., etc. Under the Act of 1866 parallelism of end lines was not required, but by the Act of 1872 parallelism of end lines is made essential, a survey of the surface ground must be made before it can be patented, and the surface lines of such survey should be marked upon the ground, whether patented under the law of 1866 or of 1872. The intent of both Acts, in this respect, is substantially to the effect that the mining locations made thereunder should be along the lode lengthwise, and the surface boundaries should be marked upon the claim. It was not intended by either Act that the locator would have any right to follow the lode upon its strike beyond the surface lines of his location. The term "location" as used in both Acts refers to the surface ground as well as to the vein or lode. The lode claim, whatever its nature, character or extent, is to be limited to the survey of the surface location, and the title to the lode upon its strike is not given to any portion thereof which departs beyond the surface lines of the location.

In Mining Co. vs. Tarbot, 98 U. S., 463, familiarly called the Flagstaff case, the Supreme Court of the United States declared that under the Act of 1866, as well as under the Act of 1872, the location of a mining claim upon a lode or vein should be made along the same lengthwise of the course of its apex, at or near the surface, and, in the course of its opinion, said: "The Act of 1872 is more explicit in its terms; but the intent is undoubtedly the same as it respects end lines and side lines and the right to follow the dip outside of the latter. We think the intent of both statutes is that mining locations on lodes or veins shall be made thereon lengthwise, in the general direction of such veins or lodes on the surface of the earth where they are discoverable, and that the end lines are to cross the lode and extend perpendicularly downwards, and to be continued in their own direction either way horizontally; and that the right to follow the dip outside of the side lines is based on the hypothesis that the direction of these lines correspond substantially with the course of the lode or vein at its apex on or near the surface." See also Iron M. Co. vs. Elgin M. Co., 118 U. S., 248: The Eureka case, 4 Saw., 323; McCormick vs. Varnes, 2 Utah, 355; 9 Mor. M. R., 505.

The patent to the Providence mine was confined to the Providence lode and to the surface ground as surveyed, and marked on the diagram filed in the Land Office. It granted no right to the owners of the Providence to the "back" vein. It was a grant to the Providence lode only and in express terms excluded a l others. The effect of the Act of 1872 was to grant to the owners of the Providence surface location all other "veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically in whatever course or direction they might run." In Wilhelm vs. Sylvester, 35 Pac. Rep., 997, the Supreme Court of California, in discussing this question, after quoting from Section 2322 of the Revised Statutes, said: "This language is clear and explicit, and, in designating the property rights of locators, is in no wise ambiguous or uncertain. It expressly, and in language which needs no construction, grants to such locators every ledge or lode the top or apex of which lies within the surface lines of the location; that is, such part of the ledge as lies within such lines. And there is no limitation or exception of any such ledge on account of the direction it may run. It may be parallel with the originally discovered ledge, or may approach it at right angles, or at an obtuse angle, or at an acute angle; it may intersect it or not, and still it may be clearly within the language of the said section."

The Act of 1872, in granting all other veins that were within the surface lines of previous locations, did not create any new lines for such veins, nor invest the court with any authority to make new end lines for such other veins. And it is apparent, from an examination of the statute, that the court has no power to make a new location for every vein that may be found within the surface lines of the location and thereby enlarge the rights of the original locators.

When the end lines of a mining location are once fixed, they bound the extra lateral rights to all the lodes that are thereafter found within the surface lines of the location.

It necessarily follows that the end lines of the Providence survey must be considered by the courts as the end lines of any and all other lodes or veins which do "inside of such surface lines." Otherwise endless confusion would arise in the construction of the statute. End lines would have to be constructed in different directions if the separate lodes or veins found within the surface lines did not run parallel with each other, and the result would be that these lines extended might give to the owners of the claims a greater length along the lode as it extended downward than they had upon the surface.

If the same end lines which bind the extra lateral rights of the Providence surface survey apply to the contact vein and to all other veins, if any are hereafter found, then no such difficulty can arise. This is the rule that applies to all locations made after the Act of 1872, and it ought not to be presumed that Congress—by its grant to prior locations intended to give greater rights to them than were given and granted to subsequent locators under the same Act.

It is settled by the decision of the Supreme Court of the United States in the Iron S. M. Co. vs. Elgin M. Co. that the same end lines bound all extra lateral rights as to all veins or lodes within the surface boundaries of the claim. Justice Field, in delivering the opinion of the Court, speaking of the rights of locators to mining ground to follow the lode in its depth, said: "It often happens that the top or apex of more than one vein lies within such surface lines, and the veins may have different courses and dips, yet his right to follow them outside of the side lines of the location must be bound by planes drawn vertically through the same end lines. The planes of the end lines cannot be drawn at right angle to the courses of all the veins if they are not identical."

In the present case the end lines of the Providence—*a–p*, and *g–h*—are conceded to be substantially parallel with each other, and that the Providence lode in its course lengthwise passes these end lines. Complainant's contention would take the "back" or "contact" vein outside of the plane of the northerly end line of the Providence drawn downward vertically and give to him extra lateral rights not granted by the patent nor given to him by the granting provisions of the Act of 1872.

But, in this connection, it is argued by complainant that respondent is estopped from asserting any claim to any vein or lode lying southerly from the line *f–g*, because (1) in its relocation of the New Years Extension claim it recognized and designated that line as the "northerly end line of the Providence line," and expressly abandoned all that portion of the original New Years Extension claim "for surface and lode which lies south of the northern boundary line of said Providence mine, which runs north 43 deg. 10 min. east, across the southeastern corner of this claim;" (2) Testimony was offered and admitted against the objection of respondent, tending to show a further estoppel which was to the effect that before the Champion shaft was started the plans therefor were submitted, by the then superintendent, to the Board of Directors of respondent and approved by it, and that the shaft was sunk, in pursuance of such plans, parallel with the line *f–g*, extended in the direction of *g'*, and that the superintendent had conversations, about that time, with complainant and his brother—a co-owner in the Providence—and stated that he would never interfere with that line and would never cross it, and that this line was practically agreed upon by them at that time as the boundary line between the two claims.

This testimony, giving it full scope and effect, is not sufficient to create an equitable estoppel.

The corporation is not bound by such declarations of its superintendent made without the scope of his agency or authority from the corporation. If respondent was given the line for which it contends it would take that portion of the lode which it expressly abandoned by its relocation. The abandonment, which is binding upon it, was to any and all lodes within the surface boundaries of the Providence location and survey; but this abandonment or agreement—or whatever it may be called—did not give the Providence any greater rights than it previously had. The acquiescence and agreement between the parties amounted to nothing more than a recognition of both parties that the line *f–g* was the boundary line between the two companies.

There is nothing in the facts of this case which gives to complainant any right to extend that line—as a boundary line—any farther than to point *g*, at which point it comes to the line *g–h*, which, as before stated, is the northerly end line of the Providence surface location, and beyond which, in a vertical line drawn downward, the complainant had no right to any part or portion of the "back" vein either by virtue of the Providence location, patent, Act of 1872, or any agreement or estoppel between the parties. Let a decree be drawn designating the boundary plane fixing the rights of the parties in conformity with the views expressed in this opinion, for a perpetual injunction, and for an accounting, if so desired; each party to pay their own costs.

In July, 1895, the case was appealed from Judge Hawley's decision to the U. S. Circuit Court of Appeals in San Francisco. In Cut No. 1 the line *E–F–B* is the one claimed in the original suit by the Providence; the line *A–C* is the one claimed by the Champion; the line *F–G* shows the boundary fixed by Judge Hawley in the decision from which appeal was taken. The United States Circuit of Appeals affirmed the decision of the lower court. The case was again appealed—this time to the highest tribunal in the land—which has just affirmed and made final the two former decisions.

The second case is also one of general importance. In this case the United States Supreme Court last week refused a writ of review to the Carson G. & S. M. Co. of Nevada Co., Cal., which was asked for by that company in its litigation with the North Star Mining Co. The Carson City G. & S. M. Co., owning the Irish-American mine at Grass Valley, Cal., brought suit against the North Star Co., alleging trespass, asking for an injunction and $825,000 damages. In the Circuit Court of the U. S. for the northern district of California, Judge Beatty, in March, '96, decided in favor of defendant. As in the case of Walrath vs. the Champion, the question in course of appeal finally reached the Supreme Court of the United States. The matter is deemed of sufficient importance to reproduce Judge Beatty's decision. It is the following decision that has just been sustained by the Supreme Court. Herewith is also presented a map which graphically illustrates the points in controversy:

This is an action of trespass brought by the plaintiff, as owner of the Irish-American mining claim, situated in Nevada county, California, against the defendant, which, as the owner of the North Star claim, has followed and worked its ledge upon its descent under the surface of the former claim. Each claim is a consolidation of a number of small claims, many, if not all, of which were located long prior to the enactment of any mining law by Congress, and is patented in the irregular shape and of the unusual size represented upon the following plate—the Irish-American being about 1500 feet square, with a strip extending from the main body about 600 feet east, and the North Star, lying 300 to 400 feet south, is about 3100 feet long from east to west and 650 to 1250 feet wide.

The plaintiff's theory is, that the apex of the "North Star" ledge runs so near northwesterly and southeasterly that if continued in its course it would cross the side lines, 1–2 and 3–4 of the claim, but that the ledge in its northwesterly course, before reaching the north side line, is interrupted by a nearly perpendicular north and south fissure or at least a distinct line of change in the geological formation of the country, called in this case a "crossing," to the west of which the ledge does not appear either upon the surface or in the underground workings. The defendant claims that the apex of its ledge runs in an easterly and westerly direction from end to end along the center of its "North Star" claim, and that its dip is northerly or practically in the direction of its main working shaft, and, while admitting the existence of the "crossing," affirms that the ledge continues to the west of it. The surface of the claim is so covered with soil, and any outcroppings of a ledge that ever may have existed are so obliterated by past mining operations, that very little can be determined by surface indications of the course of the ledge. Perplexity is added from the fact that over much of the surface there are many old mining shafts and workings in which more or less ore has been found and which are in such relative positions that they are no guide to the location of the course of any ledge. A portion of them are represented on the plat by dots and crosses.

(1). During the trial plaintiff objected to defendant's evidence based upon the North Star claim as patented, and insisted that the claims of which it is composed should be shown as originally located, and that the rights of the parties should be governed by the located lines of those claims and not by the patented lines of the North Star. This objection was overruled, and as upon final argument plaintiff insisted upon its objection, a brief consideration of it will precede any discussion of the other issues.

In this objection are involved the questions of the parallelism and of the intersection by the ledge of the end lines of the original locations. When those locations were made there was no law requiring such parallelism, but independent of all lines the right to follow the ledge along its course for the full distance claimed, and underground upon its true dip to any depth was undisputed. Although Section 9 of the Act of 1872, in repealing certain parts of the old law, provided that "such repeal shall not affect existing rights," the courts have held that when any claim is patented those rights are controlled by the patented lines. If, however, plaintiff's objection could so far prevail that defendant should be compelled to rely upon the original claim as located, instead of upon the North Star patent, it ought to follow that they should be considered as unpatented claims, and all rights which attached to them prior to patent should accrue to defendant, for manifestly it would be unjust to deprive defendants of all benefits arising from its North Star patent, as well as those which attached to the original location while unpatented. Moreover, the defendant, owning the several claims which now compose the North Star, might have procured separate patents for each claim, and in doing so might have so changed the end lines as to make them parallel, just as is always done now in application for patent, and if the several claims jointly included the entire apex, all the claims could have been so surveyed as to make all the end lines parallel to each other, and thus give it what it now substantially claims by its North Star patent. The defendant has done by one act, at less expense, what it lawfully might have done by several acts at greater expense. The North Star patent is of greater superficial area than any law has ever authorized for a single ledge location, but it has been held by the Supreme Court that, while the law prescribes a limitation to the size of a single location, there is no limitation to the number of claims one person may hold by purchase or that he may include in a single patent, and, as I understand, that may be included in a single survey showing only the exterior boundaries and omitting all interior lines of the several smaller claims. Such was the holding as to agricultural lands in Polk's Lessees vs. Wendell, 9 Cranch, 87, and as to placer claims in Smelting Company vs. Kemp, 104 U. S., 636. There appears no reason why the same rule should not apply to quartz claims. Independent, however, of the foregoing consideration, a patent has been granted for the North Star claim. It has passed beyond the field of discussion that a patent can not be collaterally attacked on account of any question which the land department could lawfully determine before issuing it. Without now defining what questions are settled by the issuance of a patent, it is held that the question of the defendant's right to a patent to the North Star, with the boundaries as defined by it, was within the jurisdiction of the department and was determined by it, from which it is held to follow that the boundary lines as defined by the patent are the only lines by which the rights of the parties can be determined. To adjudge such rights by the original lines of the several claims of which the North Star is composed would be such an assault upon the patent as cannot be sustained. The former ruling upon plaintiff's objection is, therefore, adhered to.

(2). Without making special reference to the testimony of the several witnesses as to the location and course of the apex, it may be concluded, as clearly established, that a ledge had been found in

a number of the group of old shafts existing near the south side line of the North Star. Upon one of the plaintiff's maps is indicated a line of shafts running east and west which is marked "shafts on apex." Plaintiff's witness, Huguniu, was on the ground the day this ledge was discovered in 1851, and located a claim running west from the main shaft, and he fixed a point, designated "C" on the plat, being over 100 feet westerly from the mouth of the main shaft, as within his claim and as the most westerly cropping of the ledge. He also located the apex of the ledge 50 feet south from the mouth of the Larimer shaft and 40 to 50 feet south of the old powder house, which was on a direct line connecting the mouths of the main and Larimer shafts. An apex running through these three points fixed by this witness and continued in its own direction each way would cross the south side and west end lines of the North Star, and the same result would follow to pass a line through these points and the group of shafts. I do not think that from a fair consideration of all the plaintiff's evidence it can be concluded that the source of the ledge is across both the side lines. On the contrary, defendant's witnesses locate the apex easterly and westerly near the center line of the claim as indicated upon the plat, and the witness Morse located croppings at a point designated "B," being about

better guides to the course of the apex than those far below. Plaintiff admits that there is a mineral vein along the line claimed by the defendant as the apex, but says it is but a spur or seam from the ledge which runs elsewhere, its exact locality not being fixed. That this is but a spur or seam of a ledge, and so important that it cannot be made the basis of a mineral location, cannot be reasonably concluded when it is remembered that the first locations were made upon and along it. However, the law fixes no limit to the size or prominence of a mineral-bearing vein before a mining location can be made upon it. While in the group of shafts referred to, a ledge was found; its apex or the course of the apex has not been located unless it be by the plaintiff's testimony concerning the "shafts on apex" before named, and it has not been shown that any vein crosses or is found beyond the south side line. It is not impossible that the apex of whatever vein exists at this place, if traced out, would assume a course somewhat corresponding to the outline of the group of shafts and running in a northeasterly and a northwesterly direction until it unites with the other line of apex, and that the two outcrops or ledges are but parts of one vein which are separated by a large "horse," which defendant's evidence and diagrams show exists near the surface of the mines. There is some

derground rights? That the end lines are not parallel, cannot be the basis of an objection, because their convergence when extended in the direction of the dip of the vein would give defendants less, instead of more, than the law provides for.

Attention has not been called to any precedent in which a ledge is abruptly terminated on its onward course, as is claimed occurs in this case, but a similar principle is involved when a ledge passing through an end line is terminated as to the claim, by going through and out of it, across a side line. Under such circumstances it has been held that the ledge may be followed on its descent between the perpendicular plane drawn through such intersected end line and another similar parallel plane passing through the point where the ledge crosses the side line. Last Chance M. Co vs. Tyler M. Co., 61 Fed. 560-564; Wyoming vs. Champion, 63 Fed. 511-546; Del Monte M. Co vs New York M. Co., 66 Fed. 212; Fitzgerald vs. Clark, Pac. —, which I followed in the last hearing of Last Chance vs. Tyler, — Fed. —. When the last case was first before the Circuit Court of Appeals, that Court said: "If the lode in question, instead of extending into the Last Chance location, had abruptly broken off within the surface lines of the Tyler near the point where, in fact, it crossed the line, there could certainly be no question as to the right



300 feet west from the mouth of the main shaft, and he says that he and his associates located ten claims running west from the Auburn road, "as near as we could tell on the line of the ledge." Defendant's witnesses are corroborated by other established facts: (a) Before the surface was disturbed, and when indications of the ledge were clearer, the original locations were made upon an east and west line and about along the central line of the North Star. (b) The workings of a mine made in mining operations, and not in support of litigation, are generally important as evidence of any facts which may be legitimately inferred from them. The three incline working shafts were started upon this North Star central line and are all shown to follow the ledge in their descent. It is reasonable to presume they were started upon or near the apex of the ledge. (c) The working levels in this case are not so conclusive as usual of the course of the ledge, for the reason that there are large "horses" in the mine to the upper and lower surface of which the workings have conformed, which largely accounts for the varying directions the levels have taken. A majority or many of the upper levels are nearly parallel with the north side line, while others, if prolonged, would cut the west end and south side lines, and still others would cross both side lines, and especially those in the deeper workings. But as ledges may in their depths change their course, and as the surface course or the course of the apex is to govern the miners' rights, the workings nearest the surface are

evidence, at least, to show that two veins do unite in the workings not far below the surface.

From a full consideration of all the evidence, it is concluded that the first mining locations were located along the central line of the North Star claim; that such line is practically the line of the apex of the ledge in controversy; that it has been fixed at different points along the irregular lines indicated upon the plat between the letters "C and D" and running in a direction south about 80° east.

(3). Generally when a ledge has been traced for such a distance in a claim of this size it would not be an unreasonable presumption that it would continue in the same direction far enough to cross the end lines of the claim. This presumption may be indulged as to the east end line, but as before stated, plaintiff asserts that it does not, either on the surface or underground, pass west of the "crossing," which contention is sustained by the testimony, while that of the defendant is to the contrary. Underground there may be some indications of a ledge west of the "crossing," but little if any ore has been found there and the workings of the mine, with some unimportant exceptions, sustain plaintiff's contention. Upon the surface there is nothing shown by which to definitely locate the line of this "crossing." Conceding, however, that the ledge intersects the east end line, from which it extends no farther than about 2200 feet westerly to the point "C," fixed by the witness, Morse, as the place where he found the croppings of the ledge, what are defendant's un-

or the Tyler to follow the lode or vein in its downward course for its entire depth outside of the vertical planes drawn through the side lines. The fact that it continued its course and crossed the side line does not in any manner change this principle. In either case the locator is entitled to the same rights. In such cases the end lines are not necessarily those which are marked on the ground as such. An end line may be drawn at the point where the lode abruptly terminates within the surface lines or at the point where the apex of the lode crosses the side line of the surface location. 54 Fed., 292. It is therefore concluded that the defendant may follow its ledge on its descent under the Irish-American claim and to any depth between a perpendicular plane drawn through the east end line of its claim and another similar parallel plane crossing such claim at the point fixed as the western terminus of the ledge, being designated by "C" and westerly from the east end line 2200 feet, measured along the straight central line upon the plat and along the like line upon defendant's exhibit 8: *provided*, that defendant shall in no event pursue its ledge west of a perpendicular plane extended through the west end line of its claim, and judgment for the defendant is ordered accordingly.

There was another question suggested, but as it was based upon the theory that the course of the ledge was such as would carry it across the side lines, which I cannot adopt, it will be unnecessary to consider it.

BEATTY, Judge.

Some Notes on the Recovery of Gold from Cyanide Solutions.*

S. C. COLES.

One of the chief difficulties appertaining to the economical recovery of gold from weak cyanide solutions by electrolysis has been the electrodes.† If several lead anode sheets are cut superimposed, the strips cling together, and have to be carefully spread out one by one, so that the surface may be exposed to the solution. A clean-up is made every seven or eight weeks when the wood frames carrying the lead strips are withdrawn, the lead strips removed and new substituted, the auriferous lead being ultimately melted down and conveyed to a central works to be cupelled. This method is both crude and expensive, the labor of fitting the strips into the frames is considerable, and the consumption of lead is a considerable item, having been computed by Mr. Von Gernet at the Worcester mine at $\frac{1}{10}$ of a penny per ton of ore treated and by Mr. Williams, at the Crown Reef Gold Mining Co., at $\frac{1}{15}$ of a penny.

The cathode should fulfill the following conditions:

1. The gold should be adherent during the process of deposition.

2. The gold should be capable of being readily stripped after removal from the electrolyzing cell.

3. The cathode should be electro-positive to the gold in solution to ensure the cathode being coated with gold on immersion.

These conditions are fulfilled, I find, by substituting an aluminum cathode for a lead one, advantage being taken of the fact that a loose film of oxide is very rapidly formed on aluminum, the difficulty in soldering and electroplating aluminum for this reason being well known. The substitution of aluminum for lead foil, or strip, enables the gold to be obtained as pure gold and daily returns to be made of the amount of gold recovered. It also has the additional advantage of reducing the cost of labor and economizing the amount of cyanide of potassium used, as the solution is not contaminated by any base metal such as zinc. The deposition of gold from a cyanide bath on to an aluminum plate proceeds in a uniform manner, but in such a way that the gold is deposited as a metallic sheet, which is easily detachable when desired from the aluminum cathode by stripping, peeling or rubbing almost as soon as it is formed; and if the aluminum cathode consist of a sheet of the metal fixed to a revolving drum or cylinder, by varying the rate of rotation, the film of gold can be brushed or removed from off the cathode continuously, so that the process is an automatic one, resulting in the immediate and continuous recovery of the gold without any subsequent cupellation of the lead as in the older electrolytic process.

The process has, therefore, in it the elements of economic working, coupled with the quick recovery of the valuable gold. In the Siemens-Halske process the lead cathodes remain some weeks in the bath; and the gold, which only then amounts to about one-tenth the weight of the cathode, is only recoverable therefrom after a second further operation of smelting and cupellation. In the Siemens-Halske process lead was chosen as the cathode, as it has the property of allowing the gold to adhere to it. In the aluminum process, aluminum is used as the cathode, as it permits of the easy removal of the gold film. In the former process the gold has to be won from the lead by a secondary operation; in the latter the gold is directly obtained in the form of a pure foil without any further expense or trouble. Gold by this process has been successfully extracted from cyanide solutions containing only .01 per cent of cyanide of potassium and 2½ dwts. of gold to the ton of solution. The best results are obtained when the solution is raised to a temperature of about 100° Fahr. It is also found advantageous to use a greater current density with the necessary increased voltage when the aluminum plates have been freshly placed in the solution, so as to ensure their being covered with a film of gold as quickly as possible, otherwise there is a tendency for aluminum hydrate to be formed. In about ten hours an extraction of 95 per cent was obtained by the use of aluminum cathodes, the amount of gold in solution before electrolysis being 2½ dwts. to the ton of solution and the strength of cyanide .01 per cent, and the rate of flow about 15 gallons per 100 hours for every cubic foot of electrolyzing cell, or three square feet of cathode service. Gold has been deposited on aluminum cathodes from solutions containing only .0075 per cent of cyanide of potassium, the current density per square foot being .03, and the E. M. F. at the poles of the generator 6 volts.

The following are the results obtained from gold cyanide solutions of varying strengths with aluminum cathodes and iron anodes:

First Experiment.—A cyanide solution containing 3.2 grammes equals 2 dwts. gold per gallon and 22.71 grammes per gallon of potassium cyanide, or .5 per cent solution, was electrolyzed. The aluminum cathode had an area of half a square foot, and two similar sized iron plates formed the anodes, placed 1½ inches from the cathode, the amperage being 1.50 and the voltage 1.40 at the terminals of the electrolyzing cell. The gold began at once to deposit on the aluminum cathode as a bright coherent coating, and the deposition was allowed to continue for fifteen minutes, when the amperage was found to be 2.0 and the voltage 3.40. The layer of gold could be completely and easily detached by rubbing gently with a piece of indiarubber tubing fixed on a glass rod. A fresh cathode was then inserted:

	P. M.	Amperes per sq. ft.	Volts.
Time of immersion	1:05	3.10	4.40
Taken out	1:20	3.20	4.60

The gold was removed from this cathode and a fresh one inserted without changing the conditions.

Taken out	1:50	2.60	4.70

As gold still continued to be deposited, the experiment was continued:

Time of immersion	2:20	2.80	4.70
Taken out	2:55	2.60	4.80
Time of immersion	3:00	2.30	4.60
Taken out	4:00	2 20	4.90
Time of immersion	4:15	2.60	4.90
Taken out	5:15	2.00	4.90

The whole quantity of gold recovered in these six experiments was well washed to remove traces of potassium cyanide and then weighed.

	Grammes.	Per cent.
Gold added	3.2000	100.00
Gold found	2.7108	84.70

It will thus be seen that 84.70 per cent of the total gold was recovered from the solution in 3 hours 35 minutes, using an average amperage of 2.51 per plate, or a current density of 5.02 amperes, and an average voltage of 4.63.

Second Experiment.—In this experiment a weaker solution of potassium cyanide, containing 11.35 grammes per gallon, equals .25 per cent solution, was employed. The percentage of gold was nearly doubled, viz: 91 grains equals 5.94 grammes, equals 3.80 dwts. per gallon.

The experiment was divided into two portions, the yield of gold at each stage being determined.

	Amperes per sq. ft.	Volts.
1st Stage—Time of immersion 11:15 A. M.	3.60	4.75
Taken out 1:05 P. M.	2.00	5.10
2nd Stage—Time of immersion 1:20 P. M.	2.10	4.90
Taken out 3:40 P. M.	2.00	4.80

The experiment had to be discontinued at this stage, owing to a short circuit taking place within the cell. The gold recovered was:

1st Stage, in 1 hr. 50 min., 3.005 grammes=50.59 per cent.
2nd Stage, in 1 hr. 20 min., 0.875 grammes=14.73 per cent.

A total quantity of gold amounting to 65.32 per cent was therefore recovered in 4 hours 10 minutes, although it will be noted that the greater part of the gold was deposited in the first two hours.

Third Experiment.—A solution containing 6 dwts. of gold per gallon and 32.71 grammes of potassium cyanide, being .5 per cent solution, was employed.

The gold was deposited in three stages and weighed separately, as follows:

	P. M.	Amperes per sq. ft.	Volts.
1st Stage—Time of immersion	5:30	6.25	4.30
Taken out	6:00	5.20	4.10
Gold deposited, 2.930 grammes=32.02 per cent.			
2nd Stage—Time of immersion	6:12	4.80	4.10
Taken out	6:45	4.20	4.30
Gold deposited, 1.340 grammes=14.68 per cent.			
3rd Stage—Time of immersion	6:55	2.20	2.30
Taken out	8:45	2.10	2.30
Gold deposited, 2.055 grammes=22.46 per cent.			

There was thus recovered 69.13 per cent of gold in 3 hours 33 minutes, and the greater part was also deposited in the first half hour, viz., 32.02 per cent.

These experiments demonstrate that the process affords a quick method for depositing gold from its cyanide solutions, and also show that it is easy to remove the film of metallic gold from the aluminum cathode by mechanical means.

In another experiment some gold tailings were carefully assayed and found to yield a button of gold equivalent to 1.4 grammes gold per 1000 kilograms, or, approximately, 1 dwt. per ton.

The quantity of tailings used for the experiment was ninety pounds. This quantity was placed in a suitable vat and treated by the well-known methods for extracting the gold by means of a cyanide solution. The tailings were first leached with a weak caustic soda solution containing four ounces caustic per ton of water; and, after its removal, a cyanide solution containing .5 per cent KCN was added. This solution was allowed to leach the tailings for several hours, and was then drawn off into an electrolytic vat. The tailings were then leached dry for some hours, in order to ensure the complete solution of the gold, and the double cyanide so formed was leached out with a weak cyanide solution containing .18 per cent KCN. After this solution had been drawn off into the electrolytic tank the last traces of the gold solution were washed into the vat with water. The time occupied for the whole operation was 50 hours, so that it represented the same time as is used in actual practice on a commercial scale. The total amount of liquors obtained in this way and submitted to electrolysis amounted to about 50 litres, or about 11 gallons, or about half the weight of the tailings treated.

From the above assay the theoretical quantity of gold which should be extracted from the above weight of tailings is .056 gramme, or one-thirtieth of one dwt. On submitting the solution to electrolysis a current of .29–.31 ampere was employed, at a pressure of between six and seven volts. As the area of the aluminum cathode was approximately one square foot, the current density corresponds to the amperes. The electrolysis was allowed to proceed for seven hours, and at the end of that time the gold was seen covering the whole of the cathode as a very bright golden deposit of extreme thinness. Notwithstanding the thinness of the film, it was found possible to detach it mechanically.

*Institution of Mining and Metallurgy.

†The cathode is usually lead and the anode iron; but in Mr. Andreď's process he has reversed the order, the anode being peroxidized lead plates and the cathode iron.

A Mine Lease.

"I want a good blank form for a mine lease," is a request occasionally received at this office. In a general way it is believed the following is one that may fit. It is "iron-clad" and a little one-sided, but those provisions can be crossed out or waived. It is a form in use by many mining companies that let their property to leasers:

This indenture, made this ..... day of ....., 189.., between The ..... Mining Company, a corporation in the State of ....., doing business in the county of ..... and State of ....., lessor, and ...., lessee or tenant:

Witnesseth, that the said company, the lessor as aforesaid, for and in consideration of the rents or royalties, covenants and agreements hereinafter mentioned, reserved and contained, and by said lessee stipulated and agreed to be paid, kept and performed, has granted, demised and let, and by these premises does grant, demise and let to the said lessee, upon leasehold only, for the purpose of mining in the manner hereinafter set forth, and not otherwise, to have and to hold unto the said lessee or tenant for the term of ..... months, from the date hereof, expiring at noon on the .... day of ....., 189.., unless sooner forfeited or determined through the violation of any covenant hereinafter against the said tenant reserved: All the following described mining property, situated in the county of ..... and State of ....., to wit:

That part of the ..... lode beginning on the ..... level at a point ..... feet ..... from the ..... shaft; thence along the back of said level ..... feet ..... and in height ..... feet, more or less, to the bottom of the next level above, being the ..... foot level, and only upon the ore streak or seam upon which said levels are run, and not otherwise unless hereinafter in writing stipulated, together with the use, as may be necessary in working said premises, of said ..... level and of .... shaft and ..... tunnel, in common with said company and its other lessees, contractors and other employes, in such manner as may be hereinafter stipulated.

And in consideration of said demise or lease the lessee doth covenant and agree with said company or lessor that he, the said lessee, will truly do and perform all things required by the following stipulations hereof, subject only to the reservations hereinafter contained:

1. To enter upon said premises and to work the same mine-fashion in manner necessary to good and economical mining, so as to take out and save the greatest amount of ore possible, with due regard to safety of the premises and preservation of adjacent parts of the mine, and in accordance with the special covenants hereinafter reserved.

2. To work and mine said premises steadily and continuously from the date hereof, and to completely and fully stope and work out all merchantable ore from the ground therein before the expiration of the term of this lease, so that no part of the ground shall be buried or covered over.

3. To remove such rock and earth as is necessary as fast as it is broken; to do no underhand stoping; to well and sufficiently timber said premises to the satisfaction of the superintendent of said company, at all points where required by good mining, and to repair all old timbering if necessary.

4. All shafts or winzes, if any required, shall be 3½ feet by 6 feet in the clear, inside of timbering, and all drifts 6½ feet by 4 feet, and substantially timbered and secured in good and workmanlike manner, and all stopes to be secured in like manner by timbering or stulling over the drifts; and the level above said premises shall be secured against sinking into the stope by substantial timbering in such manner as shall be approved by the superintendent of the company.

5. Whenever the company shall, by its employes, contractors or lessees, work any other portion of the mine in such manner as to require the use of the level over which said demised premises are situated, lessee shall keep such level clear, so as not to interfere with such use.

6. All dumps formed in the working of this lease shall be the property of the company; shall be made where directed by the superintendent, and shall not be picked or worked for ore by the lessee.

7. The lessee shall, at all times during the term of this lease, hold and keep safe possession of said leased premises for and as lessee of said company, and will at no time permit the same to be unoccupied, and will permit no person not in his employ, or not having permission from said company, to have access thereto.

8. All work under this lease shall be subject to

the general direction and superintendence of said company, its superintendent and foreman, who shall at all times have full access to all the leased premises.

9. No person or persons shall be employed by or remain in the employ of the lessee whose employment shall at any time be objected to by the superintendent of said company.

10. All ore taken out of said premises by the lessee is and shall be the property of said company, unless otherwise ordered by the superintendent of said company, and shall be delivered by the lessee at such convenient place on the surface as the superintendent shall direct, and shall be properly dressed and sacked by the lessee, and the cost of hauling said ore, and weighing, crushing and assaying the same, shall be paid to said company by said lessee, it being understood that the lessee has full privilege of joining with the agent of the company in seeing to the proper weighing, sampling and assaying of all ore produced under this lease.

11. Said company shall retain as royalty or rental for said premises 60 per cent of all the ore produced by the lessee therefrom, and shall pay to the lessee the value of the remainder of said ore, at the highest market price on the day when the ore is crushed and sampled, less reservations hereinafter stated; the ore retained as royalty and that purchased from lessee to be crushed and sampled together, and to be of the same assay value. The company may have the ore crushed and sampled at such mill as it may select, or may itself crush and sample the ore. The lessee may have control of assays made, and upon failure of agreement upon assay and price, reference shall be had to arbitration by one or three disinterested persons, whose adjudication shall not be lower than the lowest assay or price, nor higher than the highest assay or price claimed, and shall be final.

12. The lessee and employe shall not set up or make any claim whatsoever to any lode, vein or deposit of ore discovered in the working of this lease, but shall and do hereby concede and quit-claim all title in such discoveries to said company.

13. The lessee shall not acquire any rights from location or construction of any tunnel driven to intersect the demised premises; but all such rights, if any accrue, shall inure to the benfit of said company.

14. All blacksmithing required by the lessee shall be done by the company, unless the superintendent shall otherwise direct, and the price to be paid to the company by the lessee therefore shall not be greater than that charged any other lessee of the company for like work.

15. The said company, when convenient, will furnish to the lessee all mine timbers, lagging, powder, fuse and candles used in working under this lease, for all of which the lessee shall pay to the company the usual price delivered at the mine in like quantities.

16. The company shall do all tramming at the expense of the lessee, unless the superintendent shall otherwise direct.

17. The company may reserve from payments made to lessee for ore 2 per cent thereof until the expiration of this lease, as security that the entire amount of merchantable ore in said demised premises shall be fully stoped out as hereinbefore required, and as security that the covenants of this lease shall be fully performed; and the said lessee hereby especially agrees that if this lease shall be terminated by failure of performance of any of the covenants on his part herein made, or if all said merchantable ore shall not be stoped out before the end of the stated term of this lease, then the money so reserved may be retained in possession, and shall become the absolute property of said company as liquidated damages for failure of covenants by said lessee. Reservation may also be made from payments to the lessee of all indebtedness due by him to the company.

18. Neither this lease, nor any interest in it, shall be transferable, and any assignment thereof, whether verbal or written, attempted to be made, shall operate as a cancellation of this lease. If said lessee shall at any time cease to personally work, or superintend the work, in said premises, it shall be construed as an abandonment or attempted transfer of the lease, and the company may take immediate possession and annul the lease.

19. It is mutually understood and agreed that said company shall in no event be held liable for damages or any indebtedness that may be incurred by said lessee in working this lease.

20. If said lessee shall hide or secrete or ship any ore in a fraudulent manner, then this lease to become void and of no effect.

21. The foregoing conditions and stipulations shall not be considered as changed or modified in any way except as hereinafter written.

And it is further stipulated and agreed that the superintendent of the said company is hereby constituted sole judge of the fulfillment of the covenants herein entered into by the lessee, and any failure of fulfillment and performance by the lessee of any such covenants or stipulations shall operate as a forfeiture and annulment of this lease, and the term thereof shall come to an end, and the company shall be entitled to immediate and exclusive possession of the leased premises; and at the end of the term of this lease, or upon forfeiture thereof by violation of its covenants, the said lessee agrees to surrender to said company, its agents, superintendent, successor or assigns, the above demised premises, with the appurtenances and all improvements in good order and condition, with all shafts, tunnels, drifts and other passages thoroughly clear of rubbish, and drained, if necessary. Lessee further agrees and declares this to be his letter of attorney to the acting sheriff of the county, hereby fully authorizing and empowering him, at the request of the lessor, on the termination or forfeiture of this lease, or at any time thereafter, to enter into and take possession of all said leased premises, and the properties thereto belonging, and deliver the same to lessor without process of law, or upon termination of forfeiture as aforesaid, or at any time thereafter, the said company may, at its option, with or without force, with or without process of law, enter upon said premises and dispossess all persons occupying the same.

It is mutually understood and agreed that said company shall in no event be held liable, by virtue of any implied warranty of title or covenant in this lease contained, or otherwise, for quiet enjoyment of the said demised premises, or of the product thereof, in case the lessee should be evicted from the demised premises, or any part thereof, by any title paramount or otherwise, or in case any injunction be granted against either of the parties hereto, restraining them from working under this lease, or upon the demised premises or any part thereof.

In witness whereof the said company has, by its superintendent, hereunto set its hand and official seal, and the said lessee has hereunto set his hand and seal.

....., Lessor.

....., Lessee.

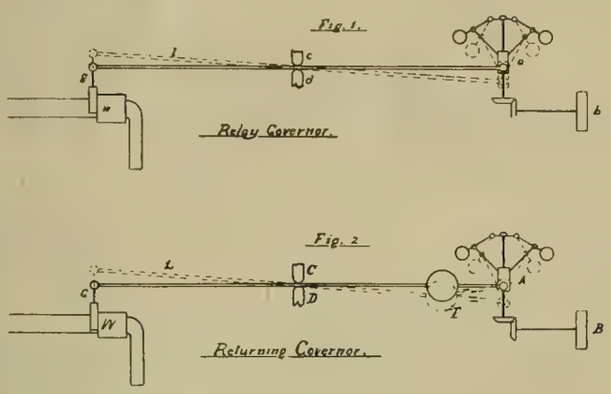


PLATE V.

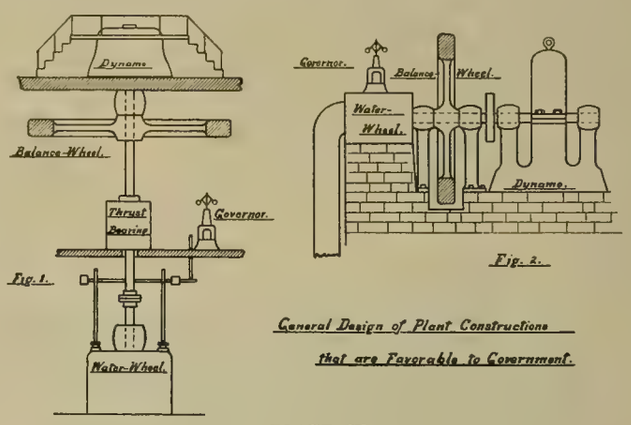


PLATE VI.

Speed Government in Water-Power Plants.*

NUMBER V—CONCLUDED.

MARK A. REPLOGLE.

Before closing it will be necessary to make a few suggestions concerning governors. A properly constructed governor must open the water wheel gates as fast as gravity can follow up with water, no faster. It must close the gates slow enough to insure safety to the penstocks, no faster. It must be capable of stopping the gates at any degree of opening. It must be endowed with the relay principle, adjusted to co-operate properly with the power storage. It must not be a separate and independent feature of the power plant, but must be made a part of the plant in an intelligent manner, and at best it is only one of the factors in the government of a water power plant. It must be remembered that all the governor can do is to open or close the gates as the variations in speed require, and no water wheel can be governed successfully by varying the gate openings unless the same principles are adhered to that make government in steam engines a success.

*Journal of the Franklin Institute.

The relay principle allows the governed motor to run at a slower speed when loaded than when running empty. This is for the purpose of using systematically the stored energy of the revolving parts of the power unit. Recently a new feature, generally known as the returning principle, has been added to some of the best-known governors. Both the relay and returning features will be shown in Plate V.

It is well understood that water wheel gates are too ponderous to be moved directly by the centrifugal effect of pendulums. It is necessary to allow the speed governor to trip some heavier mechanical apparatus which moves the heavy gates. In some governors the pendulums throw into action an auxiliary power that in turn trips the apparatus that moves the gates. In Fig. 1 a is a speedy governor, b its pulley that receives motive power from the water wheel shaft, c is a trip to cause the heavy apparatus to close the gate, d is a trip to cause the mechanism to open the gate, w is the wheel, g is the wheel gate, and l is a connection between gate and speed governor. (For the sake of convenience in the illustration l is a straight lever.) When the lever is so held by the governor balls that it touches neither c nor d, the gates do not move. If a change in load causes the speed to drop, the governor balls will allow l to touch d, and immediately cause the power mechanism to begin to open the gate. The gate in opening will raise l off of d, as is shown in dotted lines, causing the gate-moving apparatus to drop out of action. If this operation did not add new power enough to prevent the speed from a further drop, the same operation is repeated until the new power balances the demand and l touches neither c nor d. It will be noticed that the governor balls are running at a lower position after the gate has been moved to a wider opening. In practice this is a fact, and in this lowering of the speed a portion of the stored energy of the plant is fed out and used in carrying the new load, until the effects from the increased gate opening can be had. If the power storage of the plant is proportioned properly to the change made in load, the speed can never fall out of the relay limits of the governor. But if the power storage is deficient, the speed on making a heavy change in load will quickly drop out of the relay limits, and the governor will then be at sea. The effect is called hunting or racing by engineers. (Let it be understood that an increase in speed will cause l to touch c, and close the gates in a similar manner.)

Fig. 2 is similar to Fig. 1, with the exception that L is flexible or jointed at E. In a change of load L operates as a stiff lever, but after the equilibrium has been temporarily restored the lever L slowly begins to bend at E, allowing A to return to its original position. This bending or returning will cause L to touch D and add a little more water, until A has found its original position or speed, as is shown by dotted lines. It will be noticed that the power storage in Fig. 2 is made use of in adding new load, by lowering the speed in the same manner as in Fig. 1. But this defect is corrected later by the returning principle. The effect of the returning principle is to return the speed always to normal, leaving it identical with the speed at no load, a condition not ordinarily found in speed government where the relay governor is used.

Let it be understood that all steam engines that are successfully governed are controlled by the use of a relay governor, although it is not apparent to the casual observer. Some of our best steam engines use the returning principle in connection with their governing, although no reference is made to it in ordinary conversation concerning steam engine government.

The science of water power government has not yet reached so great a degree of perfection as the government of steam power, yet the underlying principles are being carefully studied by our engineers, and the time is not far distant when our water powers will all be constructed and governed as reliably and successfully as our steam plants are, but that time will not come until the same principles are recognized in the former as in the latter. (Plate VI).

Some Metallurgical Methods.*

NUMBER IV.

From the cooling floors the chloridized ore is hauled to the lixiviating works and there dropped into leaching vats, of which there are twelve, arranged in two rows, with footways between them and tramways over them. Each vat is circular, made of 3-inch thick timbers, the bottom timbers being tongued and grooved and the sides simply butt joints, the whole stayed with wrought iron straps passing around the vats. The diameter is 16 feet and the depth 7 feet, and with a 5-inch false or filter bottom, made of rough cobble stones about 4-inch ring size, and covered with a layer of straw. The vats are filled up to within about 12 to 15 inches of the top, and hold about forty-nine to fifty tons of the roasted ore.

The vat of ore is first washed with hot water, at the rate of 16 inches an hour, for one and one-half to two hours. This dissolves out a very considerable quantity of the lead chloride and salt in the ore. The wash water runs into depositing pits outside the building, where the metallic contents are precipitated by scrap iron, the after liquor running to waste. After washing, a 1 per cent solution of sodium of hyposulphite is run on the ore, and of a temperature as nearly as possible about 100° Fahr. The speed of the leaching is from 4 to 6 inches per hour, and usually takes forty to fifty hours to finish a vat. Ten hours after the leaching liquor is put on, 360 pounds of carbonate of soda are put on top of the ore under the stream of hyposulphite of soda, which dissolves it up. This is added for the reason that the lead chloride not extracted by the first wash water attacks the solution of hyposulphite of sodium, decomposing a portion of it and forming lead hyposulphite. If carbonate of soda is added to the hypo-solution, it in its turn decomposes the lead hyposulphite and forms carbonate of lead, and regenerates the hyposulphite of soda before destroyed. Lead carbonate, being insoluble in hypo-solution, is not again attacked. It was found that about ten hours after the hyposulphite solution was run on the ore was the best time to put in the carbonate of soda. Some experimenting took place to determine the proper hour, and it was found that the best silver extraction results were obtained if this rule was maintained.

The solution of hyposulphite of soda, with silver and lead in it, is conducted into one of a series of circular precipitating vats, each 10 feet in diameter and 9 feet deep. When the vat is full the lead in solution is precipitated by a saturated solution of carbonate of soda, using phenol for the akaline reaction, which is taken as a sign that the lead is all precipitated. Some silver goes down with the lead, so that the precipitated carbonate of lead usually assayed about seventy ounces of silver per ton. The liquor with the precipitate in suspension was blown with compressed air for twenty minutes or thereabouts, the precipitate settling very rapidly afterwards. When the supernatant liquor was quite clear it was drawn off into one of a series of six vats, of the same size as the lead-precipitating vats. Here the silver was precipitated out by sulphide of sodium, and, on settling, the clear liquor was run through a sand filter and elevated back to the hyposulphite tanks in the top of the building, ready for use again on fresh vats of ore. The sludge of carbonate of lead was run into two storage vats, each 10 by 7 feet, and from these was sucked into a boiler-iron pressure tank, with a vacuum created by a steam ejector. When the tank was full the suction tube was closed, the steam ejector stopped, and a tap opened which admitted compressed air, so forcing the semi-liquid sludge into a Johnson filter press, at a pressure of sixty pounds to the square inch. The liquor from this press was returned to the silver precipitating vats, and there treated. The dry cakes of carbonate of lead obtained from the filter press were sent to the blast furnaces for further treatment.

The silver sulphide was filter pressed in similar manner from storage tanks 7 feet 9 inches diameter by 5 feet 9 inches deep, and the dry cakes roasted and melted with poor lead to make a rich bullion. The roasted ore handled was equal to about 1000 to 1100 tons weekly, and the average apparent extraction of silver was about 79 per cent. The real extraction, after taking into consideration the 6½ per cent solubility of the ore, was 80¾ per cent. The roasted ore treated usually averaged between twelve to fourteen ounces per ton of raw ore. The total cost of leaching, counted on the raw ore originally crushed at the chloridizing plant, amounted to about 6s 9d per ton for all costs, including chemicals, labor, superintendence, water, light, stores, repairs, renewals, coal, scrap iron, etc. The water consumed cost about 4s per 1000 gallons, and, roughly, 100 gallons were used for each tons of ore roasted. The cost of chemicals made up 2s 6½ per ton of the total cost. The sodium sulphide was prepared in the works, being made of two parts caustic soda and one of sulphur, boiled with steam to assist chemical union.

The following represents appoximately where the silver was recovered in the different operations performed in the leaching department: In the sulphide precipitate, 75.78 per cent of the whole; in the carbonate of lead, 6.31 per cent of the whole; in the wash water, 16.44 per cent of the whole; in the vat bottoms, 1.47 per cent of the whole; total, 100.

The total men employed in the leaching works were as follows for each day of twenty-four hours: Three chemical mixers, three ore vat men, nine men at filter presses, three precipitating men, three shift bosses, twenty men removing leached ore; total, forty-one men. Salt costs 36s 8d a ton, coal 34s, and wood 14s a ton. The plant cost on completion a little over £15,000.

The Russell extra solution was used some years ago, but no apparent benefit was obtained by its use, and it has been discontinued since about 1893. Taking the hyposulphite process as a whole, it has not been very successful, due to the character of the ore and the particular form the silver found combined in. Usually the latter consists of native silver, iodides, and chlorobromides. I do not think pure silver chloride exists in Broken Hill ores. Until the chloridizing furnaces were built the process had given rather disappointing results. Better results were obtained when chloridizing furnaces began to work; but, then, the percentage of lead began to rise in the available ores. The carbonate of soda addition to the vats seems to have conquered all difficulties until fresh ores turn up. Of all the by-products made from the leaching plant, that from the wash water precipitate has been the most troublesome. As the hot wash water cools it deposits chloride of lead that is not wholly decomposed by the iron scraps, and when the precipitate from the tanks is cleaned up and sent to the smelting plant heavy losses in volatilized chloride of lead were experienced. The most satisfactory solution of the difficulty is adding oxide of lime to the solution and precipitating the lead and silver in that way as oxide. The by-product of chloride of calcium can be let go to waste. It is a matter of expense only, as the reactions are perfectly satisfactory.

(*To be Continued.*)

Forest Endowment of California.

J. G. Lemmon the California botanist gives some facts about resources in genera and species of trees.

More Kinds of Tress Than any Other Equal Area of the World.—The narrow strip of territory stretching along the western coast of North America, 800 miles long by 150 miles wide, known as California, is peculiar in many ways, and in none of them more marked than in its forest wealth. This forest possesses the most kinds of species of trees of any equal area in the world; and these trees are either the largest in dimensions or they bear the circumstances that give to the phenomenon the appearance of a distinct endowment. Omitting the broad-leaved trees, there are forty-three species of evergreen or resinous-wooded, cone-bearing trees in this State. Of these twenty are pines, six are spruces, five are true firs, two are redwood, two are American cedars, five are cypresses, three are junipers and two yews.

Our Pines.—Of these trees two of the pines are the largest trees of the family, often attaining a height of 300 feet with a diameter of 15 to 20 feet. No pine of any other land attains half of these dimensions. Four of our pines bear longer or heavier cones than are found abroad, the cones of the sugar pine being often 20 to 24 inches long and that of the Coulter pine often weighing 10 pounds. The longest cones outside of the State scarcely exceed 6 inches and the heaviest weigh but one pound.

Spruces and Firs.—Two of our spruces attain enormous dimensions. The Douglas spruce of the Sierra becomes 400 feet high with a trunk 12 to 15 feet in diameter. The great tide-land spruce of the coast is but little less in dimensions. Two of our firs become twice as large as any fir in foreign countries, 300 feet high and 12 to 18 feet in diameter, and their cones are 6 to 8 inches long, while those of the old world are but 2 to 4 inches.

Other Trees.—Our world-renowned redwoods, rising to a height of over 400 feet and enlarging while yet young to a diameter of 30 to 40 feet, with a life of 3000 to 5000 years, are not approached by any vegetable growths elsewhere.

There is scarcely a genus of trees found in the northern hemisphere that is not represented here, and the few that are limited to other regions are mostly small trees or they produce diminutive cones.

This prodigality in numbers and sizes extends to other growths. Our oaks are numerous and immense, with monstrous acorns and acorn cups. Our maples bear leaves 6 to 8 inches across.

Trees of Other Regions. — The northern part of the eastern continent, or Eurasia, is approximately 9000 miles across; North America 3000 miles. One would naturally look for three times as many pines in Eurasia as in America, but just the contrary is the case. Of the eighty species of pine, twenty are indigenous to Eurasia while sixty are in North America. The Pacific slope is 1000 miles wide, one-third of America, but it has forty pines. Of these fifteen are all in Mexico, twenty-five in northwest America and the whole number of species of pines in the world is eighty.

The Influence of the Japanese Current Upon Pacific Coast Weather.

It seems that the popular idea about the influence of the Kuro Siro or Japanese current upon our coast weather needs reviewing in connection with other wider-reaching phenomena. The U. S. Weather Bureau, makes some editorial comments upon the subject.

Popular Impressions Incorrect.—It would require a learned antiquarian to collect all the popular meteorological errors that have been started from time to time and that are still afloat in some part of the world, like derelicts on the ocean. It is not so very long since Professor Loomis demonstrated the error of those who maintained that there is a specific equinoctial gale or storm that reappears every year. We are even now just emerging from the influence of a century of delusion relative to the idea that forests produce rain and that agricultural cultivation of the soil produces drouths. We have just, within twenty-five or thirty years, obtained a clear conception of the warm, dry, descending winds when, lo! a new error with regard to them appears. A century ago it was rational to inquire whether the Gulf Stream had any influence on our own or European weather, but now we know that if it has any, it is at least inappreciable in comparison with the general influence of the ocean. Similarly in the case of the Japanese current, or Kuro Siro, which is to the Pacific what the Gulf Stream is to the Atlantic, we have now from Montana a new query as to its action in forming chinook winds. A first glance at the map of the world must arouse in the mind of a rational person grave doubts as to whether the chinooks of Montana come from the Japan stream. This latter is fully 6000 miles distant. The winds that blow over it form a part of the general circulation of the Pacific ocean; eventually, they get into a whirl around the great depression in the North Pacific ocean in the neighborhood of the Aleutian islands. The rain and fog in this region and on the coast of Alaska, British Columbia, Washington and Oregon are demonstrably due to the evaporation from the Pacific ocean as a whole and to the fact that the winds are rising up over the Rocky Mountain region.

Japan Current an Effect Not a Cause.—The Japan current, properly so-called, is due to this circulation of the winds; the winds are not due to it. Each square mile of the Pacific ocean has a slight influence on this circulation, but the Japan current does not occupy 1 per cent of this area. The mere fact that the westerly winds are rainy and cloudy on the Pacific coast but are warm and dry in Montana suffices to show that they have undergone a change in passing over the mountains and that the main features of these winds are due to something that takes place in the Rocky Mountain region and not on the coast of Japan.

The map of the winds over the North Pacific in the winter months shows a powerful and prevailing cold, northerly current flowing from the interior of Asia over Japan south and southeastward, most of which then turns to the southwest over the Philippine islands into the Indian ocean. What little passes over northern Japan and eastward to the middle of the Pacific ocean then turns northward and returns in its circulation around the Aleutian area of low pressure. Not one part in 10,000 ever reaches Montana.

Our Southwesters.—On the other hand, the southwest wind of our Pacific coast can easily be traced a little farther southwest and then southerly to the Hawaiian islands, being a part of the circulation around an area of high pressure whose center lies a little southwest of San Francisco and northeast of Hawaii. These two systems of winds circulating about the highs and lows on the Pacific represent only what is going on at the very bottom of the atmosphere. If we go up 15,000 or 20,000 feet into the region of the upper cirrus clouds that float over all this part of the globe, we shall find them all moving from the west, or between northwest and southwest. It seems likely that a slow process of interchange takes place between this highest stratum and the lowest stratum. In this process the air within the areas of high pressure has a general descending tendency, that is to say, it is drawn from the upper level or that of the cirrus clouds, while the air within the areas of low pressure has an ascending tendency, and eventually reaches the level of the cirrus clouds. But these general tendencies upward and downward require considerable time; it may be days or weeks or months, according to circumstances, to complete an entire circulation for any given particle of air. In the course of this long period any given cubic foot of air may be dispersed in all directions, some of its particles going northward and some southward, some ascending and some descending, until it is so dispersed that it would be impossible to trace the air that forms a chinook in Montana backward to any given region 500 miles away.

Rain in the Hawaiian Islands.—Our correspondent, Mr. Curtis J. Lyons, in his report for March states that "the month has been an unusually rainy one throughout the group. Kaumana, near Hilo, Hawaii, reports 55.58 inches; 10.18 inches fell at Luakaba, Oahu, five miles from Honolulu. On the

24th unprecedented floods did much damage, especially in Oahu and Kauai; heaviest rain on north side of Oahu on the 27th. Frequent thunder and lightning from the 12th to the 24th."

A study of the general circulation of the atmosphere leads to belief that the conditions that bring drouths or floods to the Indian ocean, Asiatic coasts and Australian regions move slowly eastward over the Pacific and are eventually felt in North America. We shall, with interest, look for a rainy season at some time following these floods in the Hawaiian islands.

Departure of the Monterey.

The cruiser Monterey, illustrated on this page, left San Francisco this week for the Philippines. The month of May, '98, was a momentous one for U. S. history. Public opinion declared against the hundred-year old policy of the U. S. Government, and imperiously required Hawaiian annexation and possession of the Philippines. In this San Francisco has had prominent part. It was from the bridge of a San Francisco built vessel—the Olympia, built by the Union Iron Works—that Admiral Dewey directed the great fight at Manila. It is a San Francisco built battleship—the Oregon—that is now attracting the attention of the world's naval authorities by her 14,000-mile round-the-Horn voyage, arriving in fighting trim and needing no repairs. Other San Francisco built ships have given good account of themselves in every sea and are foremost now in connection with this acquiring of island empire in Eastern waters.

The Monterey, which went through the Golden Gate en route to the Philippines last Tuesday, is a double-turreted, twin-screw, armored coast defense vessel, launched by the President of the United States—Benj. Harrison, in May, '91—from the yard of the Union Iron Works, the third man-of-war launched up to that date from the ways of that firm. She is steel built throughout, double bottom; there are 110 water-tight compartments in her hull that can be promptly filled with water, submerging her sides until she has but one foot free board.

The propelling engines are of the triple-expansion type, 30 inches stroke, the high-pressure cylinder being 27 inches, the intermediate 41 inches, and the low-pressure 64 inches in diameter, which, with the vacuum, etc., develop, with steam pressure at 160 pounds per square inch and 150 revolutions per minute, 5000 H. P. There are two steel main boilers, 11 feet 2 inches in diameter, length 10 feet 7 inches, with four other tubular boilers in addition, all designed for a pressure of 160 pounds.

The armament of the vessel is: Two 12-inch breech-loading rifled guns with 13-inch steel armor protection; shield 8 inches thick; projectile weighing 850 pounds; powder charge 425 pounds; two 10-inch breech-loading rifles mounted en barbette, with 11½-inch steel armor protection; steel shields 7½ inches in thickness, projectile weighing 500 pounds and powder charge 250 pounds.

There are also fifty-four 6-pound rapid-firing rifles; four 37-millimeter Hotchkiss revolving cannon and two 1-pound rapid-firing rifles. In addition to the above armament, she has a 15-inch pneumatic dynamite gun, which will throw 1000-pound projectiles containing 500 pounds of dynamite or other high explosives.

The Monterey was the first ship of the United States Navy fitted with the Ward sectional boilers. The engines, boilers, magazines and all the machinery is protected by armor, 16 inches in thickness.

Originally built, like the Oregon and Olympia, for San Francisco harbor defence, she, with the two named, now goes to fight foreign foes in their own waters, and, as in the case of the others, will doubtless aid in upholding the nation's flag in any stress.

In connection with the departure of the Monterey, probably never to return, it is interesting to note that in the present war with Spain, the war vessels built by the Union Iron Works of San Francisco, and largely manned by Pacific Coast seamen, fill the public eye almost exclusively. At the great San Francisco shipbuilding establishment have been built the first-class battleship Oregon, the coast defense doubled turreted monitor Monterey, the U. S. cruisers Charleston, San Francisco and Olympia. There have also been built the U. S. gunboats Marietta and Wheeling. At present the Union Iron Works is building the U. S. torpedo destroyer Farragut and the U. S. battleship Wisconsin. The recent great trip of the Oregon justifies the statement that San Francisco has an institution that has built the most perfect warship ever produced.

Something New in Dam Building.

The dams built in California by the hydraulic miners to comply with the requirements of the Debris Commission are small affairs in comparison with some of the storage reservoirs and restraining dams in some portions of the State for irrigation, electrical, and general supply: masonry dams of massive construction being not uncommon. But at Ash Fork, Arizona, has recently been completed a novelty in such building, being a steel dam in which all pressures and strains are resisted directly by the steel framework. In the dry territory traversed by the Santa Fe railway great expense has been incurred in getting water for the locomotives and stations. Two years ago the company decided to establish large reservoirs by damming some of the valleys and canyons. Three such reservoirs have been established in Arizona, two of which are formed by masonry dams, and the third by a steel dam, near the town of Ash Fork, situated four miles east of the station of that name on the Santa Fe Pacific railway (Atchison, Topeka & Santa Fe railway system), and the northern terminus of the Santa Fe, Prescott & Phœnix railway. Previous to the establishment of this reservoir, water was brought by rail from Williams, twenty-three miles away, and at times from Bellemont, forty-five miles distant. The reservoir was established mainly for the purpose of supplying the engines of the Santa Fe Pacific railway, and incidentally for supplying the town of Ash Fork and the engines of the Santa Fe, Prescott & Phœnix railway. The average consumption is estimated at 90,000 gallons per day. The reservoir has a capacity of 37,000,000 gallons, taking the flow from a drainage area of about twenty-six square miles, and it is believed that the evaporation will amount to about 9 feet per year. The steel dam is 184 feet long on top and about 300 feet in total length, if a short concrete abutment at either end is included. Its greatest height is 46 feet. Structurally it consists of a series of triangular steel-bents or frames, resting on concrete foundations and carrying steel face plates on the inclined or upstream face of the bents.

The foundations for the steel bents are of concrete, composed of one part of Alpha Portland cement to three parts of sand and five parts of broken stone. The stone used was the excavated rock, broken up by hand hammers. The foundations for the vertical and the inclined posts were built before the iron work was erected. The vertical posts rest on concrete walls, and the higher walls are faced with rubble masonry on the side facing the canyon. The outlet is a 6-inch pipe embedded in concrete in a trench excavated in the rock under the dam, the pipe terminating in a drain within the reservoir.

From the downstream end of this pipe a 4-inch pipe line extends to Ash Fork, four miles distant. A notable feature of this structure is that there is no spillway or waste weir, the dam being designed to safely permit a flow of 6 feet deep over its crest, which is believed to be greater than will ever be experienced. It may be that the flow over the crest will occur so seldom that the rock under the overfall can take the wear without danger, and a protective may be unnecessary.

State Mining Bureau Work.

TO THE EDITOR:—I notice in the current number of the MINING AND SCIENTIFIC PRESS an article signed "Miner," criticising the deviation by the present State Mineralogist from the usual custom of publishing a biennial report on the mines of the State, as called for by the law, and devoting instead a part of the appropriation for "field work" to mapping the mineral counties of the State.

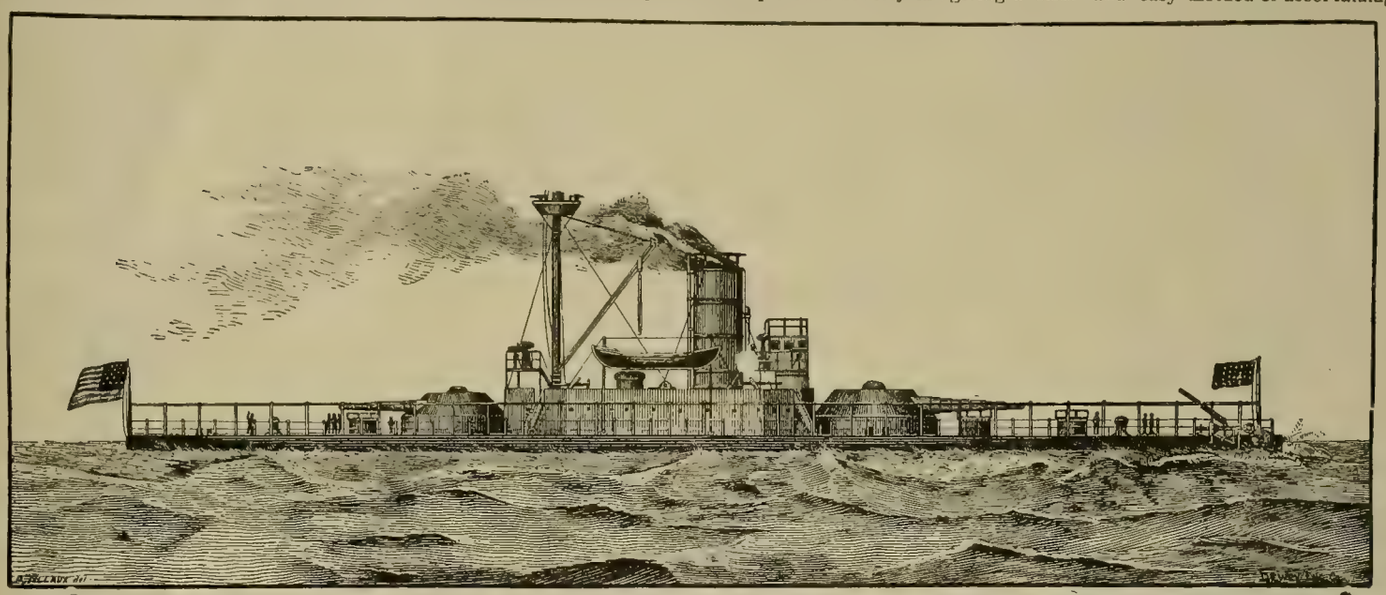
There has always been a demand for maps of the mineral counties of the State, and a general complaint that the reports of the Bureau did not supply them, the few that were on hand having long since been exhausted.

In view of the general demand for such maps it was decided to devote a portion—the 60 per cent of the appropriation for field work—to a series of maps giving a clear and easy method of ascertaining the location of every principal mine in each county. Accompanying the map will be a table giving the location of the mine, character of its ores, depth of shafts, length of tunnels, composition of its walls, power used—steam, water or electric—hydraulic or placer, name and address of owner and superintendent, number of men employed, all of which mines will have a reference number on the map, showing its precise location, distance from prominent points. This condensed information will have the merit of being portable and in condensed form, giving, as it will, about all the information usually required.

"Miner" complains that the fund for field work is being diverted from its legitimate object and purpose, and that map making is "office work," in which I beg to differ with him. The office work is merely working out the details of field work. As the last Legislature made no provision for the support of the State printing department, no mining report or other State printing can be done until the next Legislature makes an appropriation for the purpose, which would not be available for two years. Hence all field work made at the present time would be obsolete and a waste of money.

It is true the law calls for the publishing of a report from the bureau biennially, but if the State printing department has "shut shop" and gone out of business, "how can?" Meantime the work of making maps must necessarily require time, and probably until the State is ready to resume business.

San Francisco, June 7th, '98. O. L. R.



ARMORED COAST DEFENSE VESSEL MONTEREY.

A NEW use for graphite has been found in connection with brazing. It is found that by mixing a certain quantity of graphite with water or turpentine, in a thin paste, and applying this to those parts of a steel tube to which it is desired that the melted brass shall not adhere, the graphite prevents this adhesion, and does away with filling. The graphite has a strong affinity for metal surfaces and is not affected by heat, and therefore it easily keeps its place on the tubes during heating and prevents the adhesion of the brass.

Prospecting With Hand Auger and Drill.

William A. Carlyle gives some pointers that may be of value to prospectors in the following:

Having had occasion during the past year to do a large amount of prospecting work, I have found the use of a hand auger and drill of immense value in this respect, and in my practice it has largely superseded and always preceded the other forms of investigation. I believe that the information desired was thus acquired at one-fifth what it would have cost by any other method, and I am satisfied that a brief account of the work of this device will not be without interest.

Mr. Dorton, of the United States Geological Survey, has referred to the excellent results obtained in his work by the use of a small auger, and a similar instrument has no doubt been used for prospecting purposes; yet it seems to no one's interest to manufacture them—at least, I could learn of none on the market. I was therefore compelled to make them, with such additions and modifications as experience showed to be necessary. The result may be summed up in the following description of a set of tools:

1. An auger bit of steel or Swede iron, with a steel point, twisted into a spiral, with an ultimate diameter of 2 inches and ultimate thickness of blade of not less than ¼-inch. The point is found more effective when split. The length of the auger was gradually increased until about 13 inches was reached, as the apparent maximum which could be used effectively.

2. One foot of 1⅝-inch octagonal steel, with a 2-inch cutting face, which is likewise welded on to 18 inches of pipe, cut for connection.

3. Ten feet of 1¼-inch iron rod, threaded at either end for connection with 1-inch pipe. When connected with one of the drill bits this becomes a jumper for starting the holes through hard material.

4. Sections of 1-inch pipe and connections.

5. An iron handle, with a total length of 2 feet, arranged with a central eye for sliding up and down the pipe and with a set screw for fastening it at any point.

6. A sand pump, consisting of 1 or 2 feet of 1-inch pipe, with a simple leather valve and a cord for raising and lowering it.

7. Two pairs of pipe tongs or two monkey wrenches, with attachments for turning them into pipe tongs.

8. Sundries: 25 feet of tape, oil can, flat file, cheap spring balance, water bucket, etc.

The auger is used by two men, who, standing on opposite sides, turn it by means of the handle. Enough water is continually used to soften the material. At every slight change of material the depth and character are recorded.

When hard material is encountered the auger bit is screwed off and the drill bit screwed on, thus forming a churn drill, which may be used for passing through the hard material, the auger being replaced when softer material is reached. When the drill is used the muck is either worked stiff enough to admit of its being removed with the auger, or it is extracted by means of the sand pump or a hickory swab.

In passing through "wash ore" the material is brought up by the auger, put into a vessel with a finely perforated bottom (an empty tomato can, having holes punched in the bottom and provided with a wire handle, does very well), weighed by means of the spring balance, washed and weighed again, and thus an approximate idea is obtained of the proportion of ore in the material, while a sample is secured for analysis.

As the mere recollection of the contents of the several holes cannot be safely depended upon, it is very important that an accurate record be kept. To secure this is one of the difficulties encountered with ordinary foreman, though they are generally found to recognize very slight changes of material. My foremen were provided with small pocket notebooks, and were soon trained to write down everything and to trust nothing to memory.

The holes were located as far as possible with reference to some natural object, or to some other hole so located, and the distance was in all cases measured, not guessed at, the compass direction being recorded. Every hole was marked with a substantial peg bearing its number and location.

In designating the holes upon the record, care was taken to avoid all causes of confusion. Separate properties or great natural divisions on large properties were designated by letters, minor divisions by numbers. For instance, we would have for the first number a certain location on a property "Location H, Drill Hole 8000." The first number in the next natural division to the southward of the same property was designated "Location I, Drill Hole 9,000," and so on. By allowing 100 holes for the minor divisions of each locality, it was made possible to return and put in additional holes without confusion or conflict. With such a record, it was possible to plat the location of the holes in plan or elevation and give a visible representation of the "lay" of the strata intersected.

Of course, the best work with such work is done on soft material, but it is entirely practicable to go through hard material (quartzite or flint and ore being often encountered in a single hole), and the ability of this simple contrivance to go through interbedded layers of hard and soft substances makes it very effective.

The cost per foot increases considerably with depths exceeding 50 feet, but at the greatest depth I attained (some 80 feet) I did not reach either its capacity or the limit of its economical use as compared with other methods.

Up to 25 feet two men can operate it; from 25 to 35 feet, three men are necessary; from that to 50 feet, a rough frame, 15 to 20 feet high (costing something over $1) for the third man to stand on, is required. The frame can be moved from point to point. Above 50 feet, it is generally necessary to take off one or two of the top joints each time the auger or drill is lifted.

Dr. Emmens' Argentaurum.

It is much to be regretted that Sir William Crookes has thought it advisable to discontinue his experiments, in regard to Dr. Emmens' production of what he has termed argentaurum, but which he sells as gold, and claims to have produced from silver containing only a trace of gold. It will be remembered that the directions or particulars for conducting the experiment given by Dr. Emmens in his pamphlet "Arcana Naturæ" were distinctly stated to relate to other means of obtaining the transformation or transmutation than those actually used by Dr. Emmens himself. They were distinctly given as relating to a commercially unprofitable method, but, on the other hand, it was also laid down that, if the directions and instructions were followed out correctly, silver containing a small trace of gold would at the conclusion of the experiment be found to contain a greater amount. This Sir William Crookes has in some measure confirmed, for he found that one experiment with silver containing a trace of gold resulted in an increase of nearly 21 per cent in the proportion of gold present. Sir W. Crookes appears to regard this gain as within the limits of possible error in the experiment; but seemingly Dr. Emmens takes a different view, and is disposed to regard it as a proof of his contention that gold can be produced from silver. A subsequent experiment of Sir William's with pure silver from Mexican dollars resulted in failure to produce any gold; but Dr. Emmens always employs Mexican dollars having a trace of gold; this experiment is inconclusive, therefore, because, for one thing, as chemists are aware, the presence of an element has often an important effect on an experiment. If Dr. Emmens' contentions are correct, his discovery ranks in importance quite equal to any other scientific discovery of the age; for his discovery not only possesses interest from the monetary or profitable point of view of the possibility of transmuting silver into gold, but it possesses far wider significance in the possible entire change of present knowledge in all that pertains to metallurgy and other fields.—Industries and Iron.

Acclimatization in the Tropics.

The question of the white man's ability to conquer the tropics and to make for himself a permanent home in those regions is one that has mostly possessed a secondary interest for physicians in this country, but the war and projects of annexation make it probable that this will soon be changed. Porto Rico, the Sandwich Islands, and the Philippines are all tropical islands, and if they, one or all, come under our flag, doubtless many of our citizens will go thither to seek their fortunes, and the question of acclimatization becomes a practical one.

A timely discussion on this topic recently took place in London before the Royal Geographical Society, in the presence of many of the best-known authorities on tropical pathology. Most of those taking part in the debate held that there is no reason whatever why the white man should not be able to adapt himself to the new conditions of life in the tropics and protect himself against the diseases that prevail in those regions. The popular belief that the white man cannot successfully colonize the tropics is disproved by the fact that he has done so. It is undoubtedly true that many northerners who go to equatorial regions contract disease there and die, but in the majority of such cases the man is the victim tim of his obstinate unwillingness to change his habits in respect to eating, drinking and clothing, and to conform his new mode of life to new conditions.

The chief diseases, both acute and chronic, of tropical countries—those which formerly caused such ravages among the white settlers and gave rise to the prevalent theory that whites could only live in the temperate zone—are all microbic in origin and consequently preventable in great measure. We cannot, of course, expect to see them absolutely wiped out of existence, but their sting, like that of smallpox, can be extracted by means of an improved public and private hygiene. A comparison of the healthfulness of the West India islands under enlightened British rule with that of the two until recently under Spanish misrule shows what can be done by sanitation to convert a pest hole into a paradise.

Sanitation has within the last few decades wrought wonderful changes in all tropical countries, as regards health conditions, and the changes have been so great in some places that regions which were once considered most deadly are now even recommended as health resorts.

Heat and moisture are not in themselves the direct cause of any important tropical disease. The directcauses of 99 per cent of these diseases are germs. When these germs and their habits are known fully, victory will be within man's grasp. Most micro-parasites, when they are once within the body, are fairly safe. But these same parasites, in order that their respective species may keep in existence by spreading from one host to another, must at some time or another leave the human body, and during this necessary extra-corporeal state they are eminently vulnerable. To kill them then is simply a matter of knowledge and the application of this knowledge, that is to say, sanitary science and sanitation.

One earnest contention of those who argue against the possibility of successful colonization of the tropics by the white races is that, even if the original colonist lives out his natural term of years, his children will bear in themselves evidences of the degenerative influences of a hot climate. It is true that in many parts of the tropics the climate does cause a deterioration of white races. As an example of this is cited the offspring of British parents in India, who, if brought up in that country, do not reach the standard of stamina seen in the home-bred Briton. This is no doubt true of other places than India, and also of other than tropical regions, but it is not true of all tropical countries. It is a question whether it is the heat alone that works this change, or whether there are certain as yet unappreciated telluric influences which are responsible for the loss in stamina. In India, Ceylon, tropical America, and Australia, the problem of colonization may be regarded as solved. In other regions certain definite diseases still stand in the way, namely, malaria, dysentery and yellow fever in the West Indies, and black-water fever in Central Africa. The real question of colonization of the tropics lies in the finding of means of protection against the diseases named. That this means will some day, if not very speedily, be found can hardly be doubted.

Largest Pure Gold Nugget.

The largest nugget of pure gold ever found in America was picked up in California. This claim is made boldly and in the face of an article carelessly copied into the San Francisco *Chronicle* from a Philadelphia paper. The Quaker City publication cites a nugget taken from a mine near Helena, Montana, by the Conrad brothers, valued at $985, and says: "No larger has ever been taken from a mine in America, according to the best records on the subject. It was said that one was taken out of Nelson gulch once that was valued at $2300, but if it ever existed it found its way into the melting pot so rapidly that no one to-day is able to swear positively that he ever saw it. Another story tells of a $1700 nugget, but this one, too, is not to be found. The big nugget in the Conrad collection came from the Snowshoe diggings, having originally been bought from a miner named Price."

Now it so happens that Dr. Benjamin Shurtleff has in his possession the photograph of a nugget of gold found at Spring Creek, Shasta county, six miles from the old town of Shasta, June 25, 1870. It weighed 184½ ounces and had a value of $3300. Dr. and Mrs. Shurtleff, then residents of Shasta, handled the nugget and remember that it was almost entirely free from quartz or foreign substance. Their son George had it photographed and took the picture to San Francisco for exhibition. A watch and chain was photographed with the nugget by way of setting forth more clearly its size.

It is barely possible, now that a discussion of gold nuggets is to the fore, that other counties of California will come forward with specimens heretofore unmatched by Montana or any other mining region on earth, but the nugget from Shasta will doubtless continue to hold first place for size, weight and purity of quality.—Napa Register.

A WRITER in *Knowledge* makes a vivid picture of the great belt of clouds, some 300 miles in breadth, which surrounds the earth a little north of the equator. Within this belt rain almost incessantly falls, sometimes in sheets, and the wind seldom stirs. Before the invention of steamships, vessels becalmed in the "cloud belt" sometimes drifted helpless for weeks. Even now the crossing of this belt, where everything is surcharged with moisture, is a disagreeable experience for voyagers going from the North to the South Atlantic ocean, or vice versa. The belt can be traced across equatorial Africa and across the American isthmus, and the great rivers Amazon, Orinoco, Niger, Nile and Congo arise in these rain-soaked regions, which are like exhaustless reservoirs. The cause of the equatorial cloud belt is connected with the tradewinds, and in the course of a year it oscillates north and south over a distance equal to about three times its own breadth.

Mining Summary.

CALIFORNIA.

Amador.

Dispatch: At the Amador Queen No. 2, Jackson, the shaft is down 450 feet and 100 feet below the level of the tunnel where the hoisting machinery is situated. Sinking is progressing and some drifting is being done. ——The Union Consolidated mine has been closed down for the present, but operations may be resumed at short notice ——At the Amelia mine the shaft is down about 610 feet, and sinking is progressing. A crosscut has been run at the 600 level. It is intended to sink 1000 feet before drifting to strike the ledge.

Ledger: At Jackson drifting at the 500 level in the Amador Queen No. 1 has begun. The station at the 1000-foot level is nearing completion. ——The Wildman M. Co. will sink deep and increase its milling capacity to 200 stamps. To operate this plant will require about 1000 H. P.

Republican: A compromise will be made between the litigants of the Moore property. The mine is to be reopened.——Twenty stamps are dropping at the South Eureka mine. The contractor who has been sinking 270 feet from the 1250-foot level has finished his work —— Extensive repairs are making at the Kennedy mill. Ten stamps of the forty are running at a time.

Ledger: At the Lincoln mine, Sutter Creek, the old shaft has been retimbered 70 feet from the surface. Boilers are in position and ready to work.—— The Reward mine at Pine Grove has closed down temporarily. —— At the South Spring Hill mine, Amador City, development work is being pushed.——At the Central Eureka at Sutter Creek the shaft has reached a depth of 1140 feet. The ore vein shows up well in the bottom. —— At the Baliol the new shaft is down over 100 feet.

Butte.

The 2-stamp mill on the Buzzard mine at Inskip is running steadily.—— F. Brown, working on Secret creek, has been taking out nuggets lately ranging from $1 up to $13.—— H. G. Leavitt is taking out good ore and has enough developed to warrant the erection of a mill.

Calaveras.

The Esperanza Co. have their mill in shape at San Andreas for work when water can be had.—— The North Star is working a force and getting ready for fall. —— The Green Mountain hydraulic is running, but will be obliged to suspend for want of water.—— The 8-stamp mill on the Moser gravel mine commenced crushing last week.——Work is progressing at the Illinois mine and it is expected they will be ready for operations by the first of July.——Colorado men bonded the Washington and other mines near Murphy's and will commence operations soon.——McDonald & Pillsbury made a run of a number of tons of quartz from their mine and the result was satisfactory.——E. C. Loftus will resume work on the Keystone mine at Railroad Flat this month.——Sinking will be resumed on the Cherokee shaft near Altaville. ——The Bald Hill mine, near Albany Flat, owned by F. Brunner, has been pumped out, and it is said development of the mine will begin in the near future.

The *Citizen* says that in the Live Oak mine at El Dorado a rich vein has been discovered at 60 feet depth. The vein is telluride ore 6 feet in width. ——The *Chronicle* says a good body of ore has been found in the Graveyard mine at Rich Gulch. The lead is about a foot wide and the ore is said to go $250 per ton. ——Work is progressing favorably at the Illinois mine and it is expected everything will be ready for operations July 1st.

El Dorado.

(Special Correspondence).—Work has begun at the Griffith mines, Diamond Springs, preparatory to building a 20-stamp mill. A 100 H. P. electric power plant will be installed by the Westinghouse Co., ready for operation Sept. 1st.

The Larkin mine in the same neighborhood will add ten to its five stamps during the summer. At the 100 level the company has a ledge 18 feet wide. At the 300 the ledge is equally wide and of good value. The company's office is at 122 Main St., San Francisco.

The Crown Point and Lone Star properties, Diamond Springs P. O., recently purchased by a Scotch company, is pushing work on the shaft at the rate of 2 feet a day.

The Grand Victory mine, six miles south of Placerville, has its new 30-stamp mill in operation.

The Gentle Annie mine at Placerville is running ten stamps on ore from the 400 level.

The Poverty Point group, on which J. Melton is running a tunnel, has come into good ore and a mill is contemplated.

It is locally reported that the Pocahontas, near El Dorado, will resume operations upon the return of Mgr. Webb from St. Louis.

E. W. Chapman is working fifty men at the Gold Note and Philadelphia properties at Omo, about twenty miles east of Placerville.

The Star Light mine at El Dorado, after considerable dead work, will shortly begin outputting ore and running the new mill.

Placerville, June 5th, '98.

Fresno.

The *Expositor* reports a strike of rich quartz near Trimmer Springs.

Humboldt.

The Humboldt *Times* says that the beach mine at Little River is producing $200 a day.

Kern.

A cleanup of twelve tons of Kinyon ore at the Eureka mill yielded 135¾ ounces, having a value of about $2100.

The 10-stamp mill at Johannesburg has had another accident almost identical with the first one. The engine shaft broke, one flywheel going through the side of the building just as before. The whole engine was a complete wreck. They have now ordered a 20 H. P. steam engine, and will not again start the mill until the new engine arrives. The mill has plenty of ore to run on.— The Yellow Aster Co. has shut down all the mills at Garlock but one, and is having a portion of the output milled at Johannesburg. The Eureka mill in Randsburg is running with ore enough ahead for three months.

The Maggauetta G. M. Co. at Randsburg from 4 tons of ore received $550. The Black Hawk mine near St. Elmo has eight carloads of ore which will be shipped. — In the Visalia mill at Garlock only five stamps are running, owing to the shortness of water. About twelve tons of Rand ore are milled there daily.

Mariposa.

There is little general change in previously reported mining conditions. In Boston Merced stock is quoted at 4½.

Nevada.

D. Stewart of Washington will put a 2-stamp mill on his mine in Canyon Creek. Some of the rock pays $40 per ton.——It is locally reported that the old Erie properties near Graniteville will resume this summer. The property has been idle for several years.

Work at the National mine, near Graniteville, is under the supervision of G. A. Nihell. The property had been idle for some time.

In the Normandie mine, near Grass Valley, a strike is reported of a ledge of fair grade ore.——The Harmony gravel mine, near Nevada City, has closed down. The property has been profitably worked for nine years. The channel for a mile in length has produced about $1,000,000, of which $350,000 was disbursed for labor and supplies. The ground being worked out is the cause for closing down.

Union: C. Waterhouse has men opening the old Knickerbocker mine near Nevada City. It is said he intends to develop it thoroughly. The company is named the Columbus Tunnel Co.

Tidings: Work has begun at the Bismarck and Gladstone mine near Nevada City. New hoisting and pumping works will be erected. ——Poorman & Hastings, who are working their gravel mine near Nevada City, are getting their river claim near Pike City in shape for the summer's run.——A 20-stamp mill will be placed on the Live Oak mine this summer. ——The *Union* says it is locally reported that a new mill will be erected at the Live mine near Columbia Hill. The mine is owned by Dr. A. McMahon and other San Jose parties.

Union: For some time a company has been making test crushings at the St. Patrick mine Washington. It is stated that fifty tons of rock at the Ormonde mill turned out satisfactorily.

Placer.

P. Lawson is developing a quartz property near Alta.

Republican: The Mayflower mine at Forest Hill has closed down, and has thrown a great many out of work.

About thirty men are employed at the Cash Rock mine. The machinery is completed and the flume is rapidly being built.

Plumas.

The Golden Gate mine, near Crescent, struck an ore body from which good assay values are obtained. Several tons of ore are being taken out for a mill test. The property is owned by J. S. Carter and Moore Bros.

San Bernardino.

Ellerman & St. Germain, near Dale, have 200 tons of ore awaiting the completion of the new mills in that locality, of which three are in course of construction.

Shasta.

M. DeWitt struck a rich quartz deposit near Whiskeytown that prospects well in free gold.——J. Brown has bought a third interest in the Enos mining properties.——M. Walton has unearthed a rich find on Brandy creek. The ledge is about 15 inches wide and runs well in free gold and sulphurets.——Knopp & Boyd are developing a property near Centerville that has a ledge from 1 to 3 feet wide carrying a fair percentage of high grade sulphurets.

Sierra.

Supt. M. W. Mather of the Plumbago mine has purchased the Hope mine near Alleghany. The Hope was bonded to a company represented by F. Page, who did considerable work. The Plumbago people will probably begin work on the property shortly.——Work is progressing satisfactorily in reopening the old Kenton mine near Alleghany. Supt. Garnier expects to start the mill shortly on a test crushing.

Goering Bros. are working six men in their mine near Mohawk valley. The water is short and in consequence they pipe only half a day at a time. No general cleanup has been made.——The Upper Dutch mine, near La Porte, got through with the season's work and through the conditions for mining have been unfavorable this year it is believed the company is satisfied with the cleanup.——The Claybank, at La Porte, resumed operations and is running the main tunnel ahead.

Siskiyou.

Bailey & Carrick struck a rich quartz ledge on the north fork of Greenhorn, near Yreka. The ledge is 6 to 8 inches wide. They have been taking out considerable quartz and will soon make a crushing. It is estimated to yield $75 a ton.——The Yreka Co. prospecting in the Humbug mountain, near Yreka has the tunnel about 400 feet, and finds hard base rock.——The people who bonded the property along Yreka creek to mine the same by the dredger process, arrived in Yreka, and will soon have the machinery here to prospect by boring the bedrock at various points along the line of the creek. If the prospects prove satisfactory, the dredging outfit will be brought out.

Journal: Reeder & Brown are meeting with success in their quartz mine on Shasta river, in Fool's Paradise district. The ledge varies from a few inches to 2 feet in width. Some of the quartz is high grade. The miners at Oro Fino, Patterson Creek, Quartz Valley and other sections near the Salmon range have had considerable water lately to prosecute mining with good success. On the summits of the range there has also been a good quantity of fresh snow. D. McCook, at Humbug creek, is getting out quartz in his mine which is of good grade. W. F. Shurtliff is running his mill day and night and has thirteen men at work. The ledge has been paying well. The Golden Star M. Co., on Humbug, will resume work on the old Spencer property by sinking an additional 200 feet.

Reporter: F. Smith is developing a 3-foot-wide ledge on White's gulch in the Salmon River country, from which twenty tons milled $75 a ton. —The Bouvier mine on Slide creek is employing ten men and is in operation day and night.——The Hathaway Bros. are developing a 4-foot ledge on Sugar creek which yields good assay values.——Tuttle & Loverage are working on a 5-foot ledge near Cottage Grove.

News: The Diestelhorst Dredging Co. is operating in the vicinity of Horse creek and averaging $100 a day.— Stone & Nugent on Mill creek are crushing thirty tons of ore from their ledge on South Fork. The plates indicate that it will yield about $20 per ton.—— The Eureka quartz mine on Barkhouse has a tunnel 40 feet on a 14-inch ledge of high-grade ore.——The Minnette B. mine at Nolton has closed down its elevator for the season and is engaged in running an upper stratum of gravel, using two giants.

Trinity.

A good strike is reported from the Johnson & McLeod mine near Trinity Center. The company has thirteen claims in the group. A ledge 2 feet wide, that yields good assays in gold and sulphurets, has been discovered.

Ruhling & Co., near Carrville, are developing a property on which they have a 2-foot wide ledge, from which assays yield $80 per ton. They have ten tons of picked rock on the dump.

Tuolumne.

At the Black Oak mine, near Soulsbyville, on level No. 10, at a depth of 750 feet, 210 feet north of the shaft, discovery is reported of an unusually large ore body, assaying in parts $100 to the ton. The recent flow of water has been overcome by increased pumping facilities.

Sonora *Independent*: The Hibbing property, near Sonora, is under bond and being developed. The shaft is 180 feet, with a drift 110 feet. The vein is 6 feet.——At the Confidence mine, Confidence, the shaft is repaired to a depth of 810 feet. The main level is 2200 feet long. A crosscut from this level has been made which is in 6 feet of good ore.——Stoping is carried on from the 300-foot level in the old Independent mine. The vein shows 12 feet in places. The sulphurets yield $300 per ton. About 1700 tons of quartz is reduced monthly.——The Traylor Co. blue lead at Arrastraville has drifted on a vein for 518 feet. Thirteen tons as a trial lot was crushed and yielded $68 per ton in free gold; the sulphurets are high grade.—In the Little Beauty mine a tunnel has been driven over 100 feet; fifty-seven tons of rock paid $56 per ton. The vein is from 12 to 16 inches in width.——The Sonora, late Scanavino mine, includes the Duffield mine. The two are consolidated in one bond. A tunnel is in the Scanavino vein 190 feet.——The Dreisam G. M. Co., near Sonora, has an incline shaft 270 feet, a vertical shaft 110 feet, which will be connected with the incline and be the working shaft of the mine. The vein is from 18 inches to over 2 feet, and is high grade. The sulphurets are good.——The Carlotta, Cherokee, has a shaft 200 feet deep and drift about 30 feet. The vein is 8 to 16 inches wide.—— The Pennsylvania is owned by the Carlotta Co. This is sunk 200 feet. The vein is from 10 inches to 2 feet wide.——At the Dead Horse the shaft is 1500 feet deep. The vein is from 8 to 12 feet, returning about $8 per ton; the sulphuret general value is $60 per ton, with about 2½ per cent.——The tunnel at the Maine G. M. Co.'s property has reached 155 feet. The vein is said to be 6 feet wide and its value $8 per ton.——The Lost Fox Star Con. Co. have run two tunnels; one is 64 feet long and the other 134 feet. The vein will average 8 feet and runs $12 a ton, exclusive of sulphurets.

Democrat: In the Providence mine, near Sonora, the shaft has been driven 300 feet, and drifting north and south on the vein has commenced. The quartz shows 6 feet, all of which is good milling. At the 150 level ore is being extracted from both drifts. In another month the mill will be completed ——The main tunnel of the Barry is being driven ahead and has reached 155 feet.——The strike in the North Star and Black Warrior is a great one; but as the ledge has not yet been crosscut, the size of the ore body is not known.——Ferral & De Vore discovered a 4-foot vein near the Belleview. The mine will be known as the Bob Gallagher. Development work will begin at once.

Yuba.

Democrat: At the Good Title mine near Indiana Ranch sinking is progressing, the manager having determined to thoroughly develop the lode before adding more stamps.—— At the Abbie mine near Brownsville the stamps are kept busy and the results are said to be satisfactory.——The mill on the Berry mine, near Strawberry Valley, began crushing quartz and has made one good clean-up. This is owned by Chicago men. C. F. Spangler is Supt. The owners have incorporated as the Yuba Gold M. Co.

NEVADA.

A New York company has begun work on the Drinkwater group of mines near Silver Peak in Esmeralda county. The tunnel had reached 340 feet under former workings. There is a 10-foot wide ledge that is said to run $15 per ton.——The Mary mine, an adjoining property, has a ledge 5 feet wide which yields $20 per ton in the mill, and $6 by the cyanide. There are 400 tons of ore on the dump ——The Leidy Bros., in the same neighborhood, are hauling ore from their property to a custom mill which yields $45 per ton.

A. Shallenberger has sold a half interest in six placer claims at Osceola for $1400 cash to A. M. King of Salt Lake. At De Lamar, in the Magnolia, another discovery of high-grade ore has been made.——J. P. Woodbury has been sampling the Douglas tailings near Dayton to see if they can be cyanided. ——J. H. Deegan shipped gold bullion from the Pueblo mine at Denio valued at $7500.——At Stateline the Creole claim has an 8-foot face of ore that will average $12 a ton in gold. The Ophir mine made a three-ton shipment of high-grade ore; work is progressing on the mine.

On the Comstock the Sierra Nevada reports: Riley tunnel—During the week we stoped out from the fourth and fifth floors 175 mining carloads of ore. The average assays of car samples were as follows: Gold $42.96, silver 10 31 ounces per ton. Have hauled to the Nevada mill during the week 234 tons and 600 pounds of ore and milled about the same amount. The average assays from battery samples was $40.30 gold and 10.89 ounces silver per ton. On May 29th shipped 26,700 pounds of sulphurets (undried) to Selby & Co. and received returns from 27,018 pounds of sulphurets which were shipped to Selby & Co. on May 22nd. The cash receipts from the 27,018 pounds were $11,375. On June 2nd shipped one bar of bullion to the United States Mint at Carson, weighing 1428 1-5 ounces, of the bar value of $2503.27. The west crosscut from the south drift from a point 50 feet south from the tunnel has been advanced 24 feet; total length, 84 feet; face in porphyry and clay. On the 900-foot level of the Union shaft workings of the Sierra Nevada west crosscut No. 6, at a point 100 feet north from crosscut No. 5, was advanced 9 feet; total length, 127 feet; face in porphyry, with seams of clay, with a strong flow of water from the face and roof.

In Egan canyon, near Cherry Creek, the Mountain Co. has begun the operation of a cyanide plant and is handling fifty tons of gold ore per day.

OREGON.

The hydraulic plant near Woodville has changed owners and started up again last week.——E. B. Jennings has sold his mine near Table Rock, and the new company will put on a large force to further develop the property.——The mill on La Bellevue mine, near Baker City, has started, and is handling from twenty-five to thirty-five tons of ore per day.——The first cleanup for this season on the Humboldt amounted to $2000. Last year the company made four such cleanups, and they expect to do the same this year.——At the Bonanza mine three men in two days took out over $2000.——The Risdon Iron Works of San Francisco are building a boat 30x70 feet on the river near Tolo, to dredge the river. The machinery consists of three engines, one driving an endless elevator of thirty-six buckets, each bucket of a capacity of 800 to 1000 pounds of gravel, at a speed of eighteen buckets per minute, handling from 2000 to 3000 yards per day. One engine drives the buckets, one a centrifugal pump for washing the gravel, one an electric light plant. The machinery runs night and day. The plant is the property of Hickler & Berrey.

Work on the River Junction placer mines of the Co-operative M. Co., in Jackson county, Watkins district, is developing satisfactory results. At bedrock on the channel they are getting 14 cents to the pan.

WASHINGTON.

In the Butte & Boston mine at Republic an ore chute 200 feet long has been found, from which assays have been made that average $23.50 gold per ton.——In the San Poil the ore body is said to yield $75 per ton.——The Little Cove mine is crosscutting the ledge, which averages from $17 to $20 per ton.——The Uncle Sam M. Co., operating near Bossburg, shipped its first carload of ore. The company owns twenty claims, fifteen of which are on Clugston creek, and the others on the reservation. The ore shipped is mostly lead carbonate.

In the Quilp mine at Republic an ore body was recently found that assays from $8 to $15.

The Golden Harvest mine at Republic, bonded to J. M. Burke and others, has had considerable development work done. The ledge is 8 feet wide and assays from $20 to $40 per ton.

The last carload shipment from the Republic mine returned $233 per ton, of which eleven ounces was gold — In the Rebate mine, near Republic, a rich find was made last week. The property is under bond to J. M. Burke for $30,000.——At the Argenta a 13-foot ledge has been discovered that assays $6.80 in gold per ton.——At the Polar Star mine, Toroda City, three shifts are at work.

BRITISH COLUMBIA.

The main shaft of the Sunset No. 2 at Rossland is down 290 feet. The ore is over 2 feet wide. An average sample of the No. 1 grade of ore yielded $91.31 per ton. The Sunset No. 2 will enter the shipping list this month.—— The Big Three Co. has resumed work on the Southern Belle and the Mascot. On the Southern Belle the tunnel is in over 160 feet, and a seam of good ore varying in width from 6 to 18 inches is being followed. It gives good copper values.——In the Victory-Triumph the ledge has been crosscut and is 9 feet wide. The ore carries galena and copper.

Shipments have been discontinued for the present from the Le Roi, and all efforts are concentrated in developing the property. The main shaft is being sunk to the 700-foot level. ——At the Monte Cristo there are 30,000 tons of ore in the stopes awaiting shipment.

Two options have been signed for the purchase of the Bruce mine, near Trail. One

provides for the expenditure of $30,000 in development work, for which the purchasers are to have 52 per cent of the stock: the second puts the price of the mine at $80,000, with a cash payment of $10,000. Of the eight assays made by the prospective purchasers the highest was $343, the average being $65 ——H. White is again at work on the Paris & Lincoln, near Midway. A 600-foot tunnel is to be run to cut at lower level the big ledge already opened up.

The owners of the Caledonia property near Grand Forks found a 3-foot seam of copper ore that assays an average of $50 in all values. ——At New Denver a good strike is reported in the Fidelity mine.——The Second Relief, near Erie, has over 1000 feet of work, and a large amount of ore on the dump, which will be shipped as soon as the wagon road is completed. This ore has been taken from a ledge which varies from 18 to 20 inches. The values are in gold, running from $50 to $70.——The Nancy C. has a body of ore running from 20 inches to 3 feet of good value. Assays from this claim run from $20 upwards.——Near Cascade City, Forrest & Good have discovered copper-gold ore.

The North Star mine, in East Kootenai, a galena or silver-lead ore, from shipments made of about 7500 tons to the smelter, averaged $60 a ton. The cost of shipping, smelting and paying duty on lead going into the U. S. was about $40 a ton. The company contemplates erecting a smelter at the mine, and the total cost of mining and smelting will be under $10 a ton. The development work consists of about 2000 feet of drifts and shafts, about 1400 feet of which is said to be in solid ore, varying in thickness from 6 to 60 feet.——The second payment of $5000 on the Lily May at Rossland has been made. Besides the cash payment, the Lily May will also receive 42,000 $5 shares in the British Canadian corporation. Besides the Lily May, the new concern purchase the Lily May fraction, the Black Horse and the sixteen properties held by the Fourteen Gold Mines Con. Co., all in the south belt.——During May there was cleared through the Kaslo custom house 930 tons of ore valued at $67,735, containing 696,086 pounds of lead and 94,052 ounces of silver.

Work on the smelter at Trail goes on. Three roast heaps of crushed ore are burning, and last week the returns from Rossland ore were over 800 tons. The smelter people have arranged for electric power to operate their entire plant.

There were shipped from Sandon between Aug. 1st last year and May 27th last 22,993 tons of Slocan ore. Of this total the Payne mine accounted for 10,010 tons, Ruth 5374 tons, Slocan Star 3247 tons, Idaho 1864 tons, Last Chance 1384 tons and Reco 1128 tons.

At the Pothook copper claim on Coal hill, near Kamloops, a series of crosscuts reaching over a total length of some 2000 feet, is stated to have exposed the fissure for that length. The width, as exposed in these crosscuts, is from 100 to 125 feet or more. A shaft has been sunk over 100 feet perpendicularly, with a crosscut at 80 feet either way. No hanging wall has yet been exposed. The footwall is ordinary country rock, a much altered gabbro. In the crosscut are three streaks of copper ore, composed of native metal in flakes and plates, of a thickness reaching one-eighth of an inch, with considerable grey copper. The ore is stated also to carry some $7 in gold. The shaft is a double-compartment one, of a size to permit of depth being obtained, and the timbering is first-class.

Work will be resumed shortly on the Waneta and Trail Creek properties, the Copper Bell, the Copper and Copper Glance, near Rossland. The present work includes a shaft on a copper and galena vein, and a tunnel and a shaft on a copper ledge.

The force at the Ruth mine, Slocan, has been cut down to forty men and no more shipments will be made until the roads are passable.——The Slocan Star is increasing its force.

ALASKA.

Alaska *Miner*: The latest organization to do business in Alaska is the American G. M. Co.; to acquire the property and assets of the Nowell G. M. Co. at Sheep creek, the Basin and elsewhere in Alaska. At Sheep creek the properties will shortly be opened up. A twelve-drill compressor will be put in there. Work will be pushed. The hydraulic placers of the Nowell Co. are at work. Nineteen men are employed.

THE KLONDIKE.

Steam and gasoline launches are now plying on Lakes Lindeman and Bennett, between the foot of the Summit and Cariboo crossing. There are two steam craft operating on Lindeman and a gasoline launch on Bennett. Trouble is caused by jamming of floe ice at the foot of Bennett and the head of Tagish lakes, boats being frequently crushed to splinters.

Mackenzie & Mann, the contractors who were to build the railroad from Glenora to Teslin lake, and in this way open up what is termed the all-Canadian route to the Yukon, have abandoned the scheme and will recall their engineers and workmen, who were sent up the Stickeen river before the ice was out.

Navigation has opened up on the chain of lakes between Chilkoot and White passes, and boats are now passing down the river on their way to Dawson. Lake Bennett is free from ice, except a few floating floes. The ice is still firm on the upper end of Lake Lindeman, but does not impede progress down the Yukon. Most of the boats were built either on the lower end of Lake Lindeman or on Lake Bennett. Many of the builders have been waiting for the break-up since last December. Others who have started are new arrivals, who purchased boats at the lake and bundled their outfits into them. At Cariboo crossing the mounted police have another station, where every boat that goes down the river is numbered. The number is painted on the boat's side in big letters. The occupants are required to give their full names and their former residence. This gives the police a record from which accurate information can be obtained in case of accident. The last advices from Cariboo crossing are under date of May 26. A letter received at Skaguay, under that date, said that nearly 800 boats had passed through. Estimating the number in each boat at four persons, 3200 have passed down.

UTAH.

The Martha Washington mine at Silver City made a shipment of high-grade ore.——The tonnage for June of the Grand Central at Tintic, it is said, will reach sixty cars.——The shaft on the property of the Camp Floyd Co. has reached 290 feet.——The Red Wing at Bingham has let another contract for 50 feet of work on the tunnel, which has been driven 350 feet.——At the Four Aces the ore body has reappeared on the drift off the 600 level and shipments will at once be resumed. The shipments from this drift on the start yielded seventy-seven ounces silver and 49 per cent lead, $52 net per ton ——It is stated that the Sunbeam mine at Silver City has 100 tons of ore exposed that will yield $10,000.——The Annie Laurie at Gold Mountain has found an ore body that assays from $52 to $308 in gold per ton, while in addition is a fair showing of silver. The ore was encountered in the tunnel 250 feet from the mouth, where 12 feet of ore has been exposed.——The Tintic *Miner* says that at a depth of 106 feet in the Mountain View there was struck a vein of highly mineralized black quartz.——Hall & Yard of Philadelphia have taken a year's lease on the Gold Blossom in North Tintic, and have a small force of men at work prospecting.

The ore output for May from the various mines at Bingham was 3463 tons.——The Jordan & Galena is crushing 140 tons per day.——The Sunbeam mine, Tintic, is shipping ore that runs $100 a ton in gold, copper and lead. ——The tunnel in the Herschel mine at Mercur has reached 2250 feet.——The Darlington at Alta made a shipment of fifteen tons that shows 13 per cent copper and eighteen ounces silver per ton.

A shipment of auro-cyanides from the Mercur mine amounted to $25,000.——The Horn Silver shipped six cars of ore running in silver and lead.——The Executive Committee of the International Mining Congress, to be held at Salt Lake on July 6, 7, 8 and 9, aided by the local committee, have completed arrangements to entertain 1000 delegates. Up to date 600 delegates have been certified to the secretary, and more are expected. The delegates so far certified are from twenty-four different States, with Colorado yet to hear from. The *Tribune* says: "The business sessions will be in the interest of the mining industry, and will consider such questions as the establishment of a national department of mines, the chief to be a Cabinet officer. Hon. Lafe Pence will make a report upon this subject. They will also consider revision and codification of federal mining laws; establishment of branch mints and assay offices; laws of apex and extra lateral rights; mine inspection; taxation of mines; railroad relation to mineral development; the status of labor in mines, and other issues that may arise. The Spanish land grant question will be discussed and recommendations made. Papers will be read on technical and practical subjects. The citizens of Salt Lake have added a social feature to the programme. A reception will be given at Saltair. Excursions to the gold camps will be arranged for the delegates—one to Mercur and another to Eureka. Utah will have on exhibition specimens of its various resources that will add much to the interest of the occasion."

Mercur *Mercury*: Since connection was made between the tunnel and the upper workings in the Geyser-Marion three shifts have been put on, and the work is going ahead at a more rapid rate. The mill is treating more ore, the drift from the mill tunnel to the Marion workings is being pushed ahead, and exploration on the upper vein is proving the magnitude and value of the recent strike.——Assays have been made recently of the ore in the Columbia Co.'s property and values were found to run from 40 to 100 ounces silver, 12 to 32 per cent lead and a small amount of gold. The company has 3 feet of ore in the drift.——The Overland shaft has reached a depth of 250 feet and is going down at the rate of 3 feet per day. ——At the La Cigale drifts are being run on the third and fourth levels. The Scheu shaft is in ore of good quality.——Ore has been found at the South Daisy at a depth of 65 feet. The work of developing will be pushed.——There are prospects that operations will soon begin on the Eagle group ——Work will soon begin on a pipe from the Oakland shaft to the Daisy mill, two miles.

At the Germania smelter five new furnaces are started, giving the plant a total of fifteen, with a capacity for treating 195 tons of sulphide ore daily, while, with the auxiliary roasters, the total advanced to 265 tons of this class of ore a day.

IDAHO.

(Special Correspondence).—Boise basin is a depression among the mountains of the Summit and Payette ranges, and is from thirty-five to forty-five miles north of Boise City. It is nearly circular in form and has an altitude of about 4000 feet above sea level. The mountain ridges which surround it rise from 6000 to 8000 feet above the sea. The surface of the basin is broken, hilly, well-timbered and is about twenty-five by thirty miles in extent. It is drained by a system of small streams which finally converge into one stream that leaves the basin and empties into the Boise river. The principal streams are Granite, Wolf, Grimes, Elk and Moore's creeks, whose wide, gravelly beds and bars still bear evidences of the extraordinary activity which prevailed in this basin from 1864 to 1870. More than $40,000,000 in gold was taken from these creeks by hydraulic methods within the period named. The pioneers in this important epoch of Idaho gold mining were Californians, many of whom are still residents of the historic basin.

According to geological reports on this section, the gravels of these creeks are made up of granite sands and rounded pebbles of quartz, with disintegrated granite-gravel extending from the streams several hundred feet up on the hill slopes, which has made it possible to extend hydraulic work far into the banks.

At Placerville, which is on Granite creek, the beds of sand and gravel are from 20 to 40 feet deep, and this is the point at which the Bedrock Dredging Co. are building a large dredging boat of the New Zealand-Bucyrus type. Their dredge will be very heavy and is about 50 by 150 feet in size and is intended to handle about 2500 yards of material in twenty-four hours. At present the machinery is being put in and excavating is being done for water to float the boat. They will doubtless be ready to operate within a month. While a great deal of the material composing these beds and bars, workable by the modern hydraulic dredge, constitutes that which was washed down by hydraulic giants in former years and therefore robbed of its greatest values, there seems no doubt that there still remains a general average of fine and coarse gold rich enough to make good profits when the material is handled rapidly and in large amounts.

On Grimes creek the Basic Co., composed of Eastern capitalists, is building a flume, by means of which a water pressure of about 350 feet will be obtained twelve miles below Centerville. At this point electric power will be generated for the purpose of operating the dredge at Placerville and other dredges which the company contemplate building.

On Moore's creek, two miles below Idaho City, the Risdon Iron Works is constructing a dredge for the New England Dredging Co., whose holdings along this creek include a large area of placer bars which have never been worked. Their dredge will be 30x76 feet and 5 feet 6 inches deep to drain 2 feet 9 inches of water. It is stated that it will handle 2500 yards of gravel per twenty-four hours. It is expected the dredge will be operating in about a month.

Mr. T. F. Van Wagenen, formerly of Telluride, Colo., is manager of the dredging and electric-power enterprises of the Basic Co. and the Bedrock Dredging Co.

Mr. Rupert Winters is manager of the New England Dredging Co.'s work.

At Granite creek, below Quartzburg, a considerable amount of work is still in progress by the ordinary hydraulic method, as is also the case near Centerville, Pioneerville and above and below Idaho City.

At Quartzburg is the location of the old Gold Hill quartz mine, now tied up by litigation, but which operated at a big profit for about thirty years. Above and adjoining the Gold Hill is the Iowa group, owned by D. E. Coughanour and associates, which is being well developed. A 10-stamp mill on the ground is to be supplemented by a cyanide apparatus. Mr. Coughanour owns a 20-stamp mill at Silver mountain. This will be moved to Quartzburg and added to the Iowa mill.

The Newburg, two miles from Quartzburg, is being developed from two tunnels, one of which goes in on the vein. The property has about 500 feet of tunnel work done. About 550 feet below the mouth of the tunnels is the forty-ton Bradley mill, which operates a little on the plan of the Chili mill, the crushed material passing from the crushers through screens over stationary plated tables. This property belongs to Denver parties. C. H. Clemans is mill superintendent and George Barry mine superintendent. The mill is said to work satisfactorily.

The Morning Star lode mine, situated in the vicinity of Pioneerville, is being developed by Wm. Sweet, who finds the ore a free-milling, porphyritic quartz containing fair values.

Near Centerville the Twin Sisters quartz mine is being developed under the management of A. C. Fralik. A 10-stamp mill is being built on the property.

The placer property on Elk creek, recently sold by K. P. Plowman to R. J. Anderson and associates, is being put in condition for further work.

The future prosperity of Boise basin depends upon the success of the extensive dredging enterprises being launched and the success of quartz mining in the contiguous mountains. Various parties have been successful in enlisting a good deal of capital in both kinds of work. The dredging companies are exhibiting a great deal of energy, and the prospects for Boise basin are growing brighter.

WASCOTT.

Idaho City, Idaho, June 2nd, '98.

The Upper Boise Hydraulic Co. near Boise is running two giants. They have been stripping a large area of gravel which runs in good values. The company has constructed about 9000 feet of ditch, two-thirds of which has been blasted through solid rock. The ditch carries 3000 inches of water and a head of 250 feet is secured.——Two contracts have been let for development work on the Paymaster mine at Murray, each for a tunnel of 100 feet.

It is locally reported that work on the Waverly mine at Florence will be resumed. The Waverly was closed down last winter. ——It is stated that the Double Standard, one of the claims of the Red Bird Co., is looking well with a 3-foot vein of milling ore.——W. F. Howard, near Mountainhome, has resumed operations on the Bonaparte mines and will begin crushing ore shortly.——At Blackbird Rose Bros. have opened a body of sulphides containing streaks of native copper.——The Queen of the Hills mine is crushing fifteen tons of ore per day.

At Saltese, G. P. White is developing a property in which he has a 5-foot wide ledge, running from 30 to 50 per cent copper, carrying more than enough gold to pay the cost of mining.

The Brown Bear group of mines in Blackbird district, near Salmon, has been bonded to the Glasgow Expl. & D. Co. of Scotland.

MONTANA.

Lueck Bros., leasing on the Bamboo Chief mine near Virginia City, shipped three tons of ore which assayed $500 to the ton. The mine has been worked twenty years.——Conway & Whitmire shipped thirteen tons of ore from the Navahoe mine near Virginia City. ——Holmes & Hayward, who have a lease and bond on the B. & L. mine near Madison, are working four men. They have a tunnel 200 feet, and say they are getting good assays. ——Connor & Pyle have taken a lease on the O'Brien vein at Neihart. They have a good body of ore and will soon make their first shipment.——Mr. Savage is working a force on the Sunnyside at Washington Bar, doing development work chiefly, and has out a pile of ore which he expects to ship as soon as the roads get in condition to haul over.

The G. & B. mine at Clancy made a two-carload shipment of ore.——Freyler Bros. have taken a bond on the New Stake mine and begun to unwater it.——The old Gregory mine is again making occasional shipments. ——Buzzard & Co. made a carload shipment of ore from Navahoe.

At Sheridan the Montana mine has considerable ore on the dump. The mill on this property will be started shortly.——H Kallis shipped five tons of ore from the McKinley mine.——The Ruby Placer Co. on Wisconsin creek is hydraulicking. They have two giants in operation.——W. McDougal, leasing on the Keynote mine, made a shipment of fourteen tons of galena.——Steiner Bros. made a shipment of 360 sacks of ore from their mine. A shipment made a few weeks ago netted the owners more than $50 to the ton.——Armour & Jeffries made a shipment that netted them $250 a ton.

Lewis & Quillus shipped two cars of ore from the Broadwater mine at Neihart.—— The Hidden Hand owners shipped a carload of good ore. They have several carloads more ready to ship.——The Deer Lodge M. & S. Co. made a carload shipment of high grade ore. ——J. H. Riley will begin soon the season's operation on the Way Up mine at Libby. The work on the property will be pushed. A contract will be let at once for 500 feet of development work.

L. C. Parker of Garnet has cut the Nancy Hanks lead on his claim at a depth of 150 feet. The Shamrock and the Nancy Hanks are the two great producers of the camp and the lead which runs through both of them is about 3 feet wide. The ore is said to run over $100 to the ton in gold and carloads to the smelter net the owners from $1300 to $2000 to the car. The ore is hauled to Bearmouth station and shipped to Butte. The strike made by Mr. Parker has created renewed activity in the district and many prospectors are at work in the surrounding hills.——The upraise in the Daisy mine at Cooke connecting the two tunnels has been completed. Enough ore has been blocked out in the mine to keep the fifty-ton concentrator running four years.

For 1897 the Exploration Co., Ltd., a London corporation which holds in Colorado, Montana and Mexico, has given out a statement of its operations and earnings. The balance sheet shows an issued capital stock of $5,500,000, a reserve of $2,000,000 and credit balances equal to $835,055.

The income account for the year shows a total of $981,995 and the expenses footed up $190,725, showing a net profit of $791,270. The directors recommend a dividend for the year equal to $187,500, or 12.5 per cent on the par value of the shares. The dividend for 1896 was 10 per cent.

The report says: "In the opinion of the directors, the company's assets are of greater value than the amount stated in the balance sheet, and the directors have adhered to the policy of spreading the risks taken as widely as possible. The company still holds a considerable interest in the Anaconda Copper M. Co., and the reports received from the mines continue satisfactory. The Grand Central mine, a source of anxiety for some time, is developing well, and improved profits are being made. The business of the company during the year has brought with it some disappointments, which have, however, been more than counterbalanced by successes."

The April returns of the Montana M. Co. state the total output for the month was: Gold, 2000 ounces; silver, 8540 ounces; obtained from 6400 tons of ore crushed and 4305 tons of tailings from the dams. The treatment of these tailings cost $5609. The value of the output is estimated at $44,500. The various expenditures amounted to $50,300, leaving a net loss of $5800. The tailings plant resumed work on April 18.

The Butte & Boston smelter and concentrator are both at work on the ores from the Boston & Montana mines, though some Butte & Boston ore is being reduced. Some custom ore is also being handled though the great bulk comes from the Boston & Montana Co. This company is having its plant at Great Falls enlarged so that its capacity will be increased one-third.

The Washoe Co. is reported to be preparing to sink a shaft 1000 feet deep on the Hesperus lode claim. This is one of the several claims including the Yellow Jack, the Colorado fraction and the Lizzie lode claim which came into possession of the Washoe Co. several weeks ago. It is now stated that the whole consideration was $400,000 for all the claims, a part payment being made on each and a bond taken for one year, in which time the claims will all be thoroughly explored.

There are about 600 gold mills in present operation in Montana with an aggregate of nearly 7000 stamps.

WYOMING.

At Grand Encampment, Gleun & Hood are working the Iron Masque mine with success. ——F. Rock is developing a copper property near Beaver.——Jones & Williams are working a lead and silver property at Spring Creek. They made a carload shipment, for which they received satisfactory returns.

The *Boomerang* says Denver and Laramie

parties have located thirteen and a half miles of placer ground in the Platte canyon, North Park, Colo., and in Wyoming. Development work will begin at one.

SOUTH DAKOTA.

D. C. Boley, near Deadwood, is developing a fair-sized body of shipping ore.——The American Express mine has been sold to Pennsylvania people for $25,000.——On the Garden City mine Burns & Little are taking out a fair quality of shipping ore.

COLORADO.

BOULDER COUNTY.

The Enterprise at Eldora has started up again under the old management.——The Village Belle shipped their fourth carload of ore.——The Dimmick mill at Ward is running on tailings from the Utica mill.——The Mountain View is down 50 feet and has a 5-foot vein, running $78 per ton.— The Enterprise at Eldora is reported sold to Mitchell & Bailey for $60,000. The new management will put a large force to work soon. The shaft is 100 feet deep and in the sinking of this several thousand dollars was taken out.——The Revenge made their first shipment. This is rapidly developing into a mine.——On Eldorado mountain in the Antietam a larger force has been put to work.——The Newmarket people at Ward shipped two carloads of ore.——A tunnel is being run at Eldora by the owners of the Ohio No. 2. They have 6 feet of sulphide ore that runs $12 60 per ton.

CHAFFEE COUNTY.

Bugbee & Page are working on the White Crown near Whitehorn. They have a vein of hematite and quartz that assays $24.80.——A. Johnson bought the controlling interest in the Prairie and will put on machinery at once and push development. Two carloads of ore are on the dump ready for shipment, that runs from two ounces to five ounces in gold per ton.——Among the recent strikes is that on the Vulture on Cannon mountain of an 18-inch vein that runs $80 in gold to the ton.——Col. Hogle's force has been pushing development in the eastern side of the district. Ore from the bottom of the shaft assays from $40 to $60 in gold to the ton.——The old Belle at Granite is being worked by lessees, who are doing considerable development work; they made three shipments which gave them $120, $140 and $160 per ton.——Lessees of the New Year at Granite have a shaft 103 feet deep. One shipment of ore gave $120 per ton. They have an 18-inch pay streak and about 3 feet of mill dirt.——The Sedalia mine near Salida has found a new ore body. This is a copper property and said to be the only one in Colorado worked exclusively for copper.

In the Elder lode, on Cameron mountain, near Whitehorn, the shaft is 80 feet and shows a vein 8 feet wide. A recent mill test gave $18.80 in gold to the ton.——Three of the properties in the Klondike section made shipments, the L. S., Holdredge and Domingo. If ore holds up to the assay tests it will net close to $100 to the ton. In this neighborhood lies the Nebraska tunnel, in which was found a 3-foot pay streak. This tunnel has cut through a 2½-foot vein that gave a mill run of $62 to the ton.——A new copper streak 5 inches wide has been opened on the Gold Bug, in the Turret section. This streak also carries gold, ranging from $34.80 to $87.60 to the ton. A two-car shipment was made.——The Ethel S. tunnel has resumed work. It has a number of copper dykes. Some of these dyke croppings run as high as 30 per cent copper, and all the veins carry gold. An assay on one of these veins gave 37½ per cent copper.——F. J. Martin has bonded and leased his Rudolph M. to St. Louis people for $10,000. Assays average between $20 and $25 in gold to the ton. The vein is some 3 feet wide, with more than a foot of pay.

CLEAR CREEK COUNTY.

A crosscut in the Griffith mine near Georgetown opened a fine body of ore carrying a large per cent of lead.——The Topeka mine's daily shipments reach forty tons of medium grade milling ore.——The Bon Ton mine at 265 feet has a 2½-foot body of mill and smelting ore that gives $87 per ton.——Much activity is noticed in the Freeland district. Capital and an experienced manager have taken hold of the Lone Tree and are putting it in shape to resume production.

EL PASO COUNTY.

A strike has been made in the Morning Star, Cripple Creek, belonging to the Enterprise Co., on Raven hill. It is worked under lease by Carruthers & Chilcot, who will open the property to a depth of 200 feet before starting to make regular shipments. In their 100 level they have 18 inches of ore that assays from $20 to $70 a ton.——On the Ingham the company has reached the vein at 100 feet below the tunnel level. A shipment of forty tons was made. The lessees continue to produce about twenty-four tons a day.——The station for the fifth level in the Gold Coin is finished and the crosscut to the vein has started. The mine is shipping its usual 130 tons a day and the grade is improving.——The Columbine-Victor tunnel is 1600 feet into Squaw mountain and progressing at the rate of 7 feet a day.

The output of the mines of the Cripple Creek district for May is estimated to be 34,000 tons of all grades, the gross value of which is $1,250,000.——The Isabella Co. is not in rich ore, so far as is known, but Mgr. Kilburn is doing a large amount of development work. In the neighborhood of 175 men are on the payroll. Enough ore is being taken out to meet the running expenses.——J. O. Hardwich sold a controlling interest in the Montreal Co.'s stock to Eastern people for $50,000, or 10 cents per share. It was a cash transaction. The Montreal Co. owns a number of claims on Copper mountain and Mineral hill. The principal one is the Fluorine.——The Elkhorn, on Carbonate hill, made five shipments the past few weeks, the lowest running better than $50 and the highest over $200.——The Portland, Gold Coin, Independence, Strong, Granite, Dead Pine and two or three others have marketed more ore in the last thirty days than ever before in their history, with the possible exception of the Strong.——In the Coriolanus, on Battle mountain, in a new shaft, there is 6 inches of talcy ore that assays from ten to seventy ounces. The low grade stuff runs from $200 to $300 per ton.——F. Pettingell bought the Clyde mine at Victor for $25,000 cash.——J. O'Hanlon of Pittsburg bonded for two years at $125,000 the Colorado City mine, Cripple Creek, and will erect a plant to sink the double-compartment shaft to depth. The property has a good shipping record.——After sinking a shaft 300 feet, the lessees on the Temoni, in a surface trench about 50 feet from the shaft, opened up a wide body of ore assaying as high as $40 per ton.

The Anchoria-Leland has opened the south extension of the Johnson chute which gives 80 feet of stoping ground in a body of ore that ranges from 1 to 4 feet in width of a better grade than anything the mine has produced for several months past.——The Anaconda Co. holds its production of mill ore steadily at 800 tons a month.

Smith & Watson shipped the ore in their lease on the old workings of the World's Fair; 6 inches of the ore streak will run from $800 to $1000 a ton.——The Midland Terminal has completed a sidetrack at the Elkton ore house, so that all mineral mined in that property is now loaded directly into the cars. The Elkton at present is shipping on an average of 80 tons per day.——The annual report of the Portland mine of the Cripple Creek district for 1897 shows that the company extracted 18,852 tons of the gross value of $1,117,642.65. There were 58,734.74 ounces of gold and 5543.8 ounces of silver. The treatment charges amounted to $184,003.61. The company paid dividends to the amount of $30,000 per month —$360,000 for the year, and the total amount paid in dividends up to the first of the year was $1,267,080. The amount of monthly dividends has been increased to $45,000 this year, and up to the present time $1,403,000 have been paid in dividends. The company has a fund of $350,000 in the treasury.——The Pinto, worked by the Pinto Leasing Co., shipped 60 tons of $100 ore. —— For May the several plants in the Cripple Creek district handled 25,100 tons of ore that had a gross value of of $665,000. The tonnage sent to the smelters was fully 9,000 and a low estimate of its value is $66 per ton, which means $585,000 gross. The tonnage handled by the different stamp mills was so small that it is not given in the total. A few hundred dollars of placer gold was also taken out of the ground in the northern portion of the camp.

One of the features of the month is the unusually large production of the big properties, and another is the high average per ton of the mill ore treated. This average, which generally runs between $24 and $25, was increased to over $26, according to the official figures from the mills.

Johnson & Co. found good results of their their work on their Gold Sovereign lease. The only difference in the ore from the upper workings is a change from sulphides to oxides. The rich seam of talc in the upper level has been transformed into quartz upon the acquisition of depth, but retains its values in sylvanite. The general average of the ore is from twenty to twenty-six ounces. There are now five producing shafts on the Gold Sovereign ground and the company has received $9000 in royalties the last four months.

The Lucky Guss M. Co. owner of the Lucky Guss mine, Cripple Creek, has taken the mine out of the hands of the lessees. For several months past the mine has been worked by the miners formerly in the employ of the company, to whom it was indebted for back wages and, being unable to liquidate, allowed the men to take out ore until the indebtedness was cancelled. The employes were much more successful than the company in finding rich ore, and not only have all back wages been paid, but the men have been averaging over $6 per day for their work for several weeks past. They closed their lease with a final shipment of twenty-five tons of three-ounce ore.

Denver *News*: The increase in the quarterly dividend of the Victor from $50,000 to $100,000 has created comment among mining men. The reserve fund is not far from $250,000. This will leave $150,000 in the treasury. The ore is in sight, and it is only a question of cars to transfer it to smelters and mills. With rails laid to the ore bins from the Florence & Cripple Creek railway, the Victor is now in position to keep up a production averaging from 110 to 155 tons per day.

GILPIN COUNTY.

During May there were shipped from Black Hawk 256 cars of ore and concentrates, aggregating 4096 tons.——The shaft in the Centennial mine is down 220 feet. When the water is out drifts will be started. They are in a crevice of low grade white iron.——The water which has obstructed operations in workings No. 5 of the Bobtail at Black Hawk has been drained and five power drills are at work. The vein will be cut 350 feet deeper than the old work. Other properties in that section will also be drained through the same channel and new ground be in condition to work.

The Victoria M. Co. has some lode and placer claims in Moon gulch which it is developing. Lessees on some of their placer ground are taking out coarse gold.

GUNNISON COUNTY.

The Jimmy Mack mine, in the Tin Cup district, after years of idleness, is about to resume work. So soon as the mill can be made ready, work will commence on the bodies of low-grade ore. The mill is being modernized so as to make closer savings. It will also treat ore from the Gold Cup mine.

A test made on ore discovered near Marble runs $280 per ton in gold. The streak is 6 inches wide.

HINSDALE COUNTY.

Boston capital has purchased the Lellie and Baltimore claims near Lake City. The claims have shown some good ore of gray copper, carrying gold and silver. It is intended to start work immediately with as large a force as can be used.

LAKE COUNTY.

The Colonel Sellers of Leadville is shipping six carloads of ore daily.——The Garibaldi tunnel has reached 4000 feet. So far the only body of ore found is an iron-sulphide, too low grade to pay. A small streak has been opened of ore running $40 in gold and about $10 in copper.——The iron-sulphide ore of the Mike and Starr carries ten ounces of silver, some gold and copper and about 35 per cent iron.——The Bull's Eye, belonging to the Iron-Silver Co., is shipping five carloads of ore daily that runs 50 per cent iron and six ounces of silver.——The Ibex mine has large bodies of copper-sulphide ore which makes a good concentrating material. The company propose changing their cyanide mill to a concentrator.——The result of the Home M. Co.'s operations will be to add 850 tons to the daily output of the gold belt at Leadville, permit the resumption of operations in several large sulphide producers and give employment to hundreds of miners. The full amount, $50,000, to perfect the organization, has been subscribed.——The Monarch Co. is employing thirty-five men; shipments are steady.——The Dyatt lease on the Gallagher continues to ship 100 tons daily of a good grade of sulphide.——High grade chlorides have been found in the Elk mine. The streak is 2 feet wide and is high grade lead, studded with chloride, which is 75 per cent pure silver.

Paddock & Fogel, on the Tucson shaft of the Iron Silver mine, at a depth of 640 feet, opened up a body of sulphide and are making shipments.——The daily output of the Cyclops and Marian leases of the Small Hopes Co. amounts to 250 tons per day.

OURAY COUNTY.

Development work on the Kentucky Giant has exposed a new ore body said to be of good values.——The installation of machine drills soon to commence at the Treasury tunnel awakens interest second only to the Meldrum tunnel. The Treasury Tunnel, M. & R. Co. is a corporation capitalized for $500,000, composed of Pennsylvania capitalists. The tunnel will be 7920 feet long, 8 feet wide and 8 feet high, and will run from a point near Ironton under Commodore peaks to the head of Silverside basin. The veins which will be cut are the Bob Tail, Virginius, Tom Boy, Argentium, Columbia and Japan. The above mentioned veins have already been discovered. It is estimated that two and a half years will be occupied in construction. The tunnel will cut the crest of the range nearly 3000 feet from the surface, and deep mining will be one of its principal objects.——Shipments from the O. & N. continue and the values are satisfactory. Sixty-five men are employed and the output averages four cars of high-grade ore per week.——Work is soon to commence on the Bachelor No. 2, a claim on Mount Hayden. Some good ore is found on this property.

PARK COUNTY.

Development is progressing on the Mabel Grace, in the Freshwater district. The new machinery is all in place. In a short time the shaft will be going deeper into the ore bodies that have already been found.

A shipment of 4858 pounds of ore from the King Solomon mine near Como returned $110.67 per ton. The values were 5.49 ounces of gold and 1.5 ounces of silver per ton.

PITKIN COUNTY.

The Tycoon mine, which has been closed down for a long time, is about to start again under the management of Aspen parties.

SAGUACHE COUNTY.

H. Heukauffer is steadily working his Garfield mine near Crestone, leaving the ore body standing. He has 400 feet of ore exposed that will average $40 per ton gold.——The Commodore of Creede is preparing to double its output. They are getting the fourth level in shape as fast as two shifts can do it.

SAN JUAN COUNTY.

The daily output from the North Star mine near Silverton averages fifteen tons of good mineral. About twenty men are employed.——The Veta Madre group has opened an ore body that yields two ounces gold per ton from wall to wall.——Ten stamps of the Alleghany 20-stamp mill near Telluride are dropping on ore from the Contention group, owned by E. A. Hockley & Co. By mill runs the ore has averaged $35 per ton in gold; fifteen men are employed on development work. —— T. J. Hurley of New York has made arrangements with an English company to operate the Occidental mines of the San Juan district. Tests are to be made on the large body of low grades exposed, and if development proves their permanence, the proper method of treatment will be decided on and a large plant erected.

Four cars of ore, comprising forty tons, were shipped from the Esmeralda mine, near Silverton. The ore will run $50 a ton in gold.——The Menominie mine has resumed work.

SUMMIT COUNTY.

Great activity is shown in the placer development of this county. The Pence-Miller Placer Co. own 1600 acres of ground near Breckenridge and are employing 112 men and thirty teams on the ditch. It is expected the hydraulic elevators will be at work shortly and will continue during the season.——The Mountain Pride is employing twenty-five miners and shipping twenty tons of smelting and ten tons of concentrating ore weekly. The shaft is 500 feet deep and cut by a 700-foot tunnel at 145 feet.——A 2-foot body of iron manganese has been struck in the Iron Mask. In this mine native sulphur, 75 per cent pure, is occasionally found near the lead ore.——Over 600 tons of smelting ores and concentrates were shipped from Breckenridge last month.

There is a project on foot in Summit county to sink at least 1500 or 2000 feet with a diamond drill for the purpose of obtaining a knowledge of the formation below present development and its value with reference to mineral deposition. There has been no deep mining in Summit county because of the wealth found in the upper strata.

SAN MIGUEL COUNTY.

The Tomboy mine, Telluride, shipped two gold bricks last week amounting to 3000 ounces.——The Iron Springs mine at Ophir is making regular shipments.——The Shoemaker mine is making shipments of high grade free milling gold ore.——Southard & Co. are working the Gold Crown.——McDougle & Co. are taking out good ore from their lease on the Globe.

In Marshall basin, near Telluride, a strike of rich ore was made in the Little Mary mine. The ore streak varies in width from 8 to 18 inches. The drifts will be pushed and a shaft sunk on the vein.——In the Elkhorn M. Co.'s Sunshine group an ore body has been found that contains 2 feet of shipping ore. The first carload netted $65 per ton in gold, copper and silver.

NEW MEXICO.

The Aztec, near Elizabethtown, has again resumed operations and is producing gold, after lying dormant for several years. This property is in the Ute Creek district and is equipped with a large mill, tramway, etc. Its production has been from a depth of less than 300 feet.——The Gold Nugget placer mine at Elizabethtown has resumed operations.——At Pinos Altos six quartz mills are running full capacity.——The old Gypsy mine at Kingston is being unwatered.——After one year's idleness twenty men have been put to work on the Black Copper mine, near Franklin.——Fifteen tons of ore from the Gold Standard mine at Golden yielded $600.——At Santa Rita Ashton & Roach have an ore body that assays 10 per cent copper.——The Santa Rita Copper and Iron Co. are shipping three cars of iron ore per day, and a large amount of copper ore. They employ eighty men in the mines.

The San Pedro copper smelter at Las Vegas has begun operations. The capacity is 200 tons per day, and the adjacent mines can supply material for its full capacity.——The Crown Point, at Golden, shipped 100 tons of ore that netted $10 per ton.——The Midnight lessees, at Red River, from a four weeks' run, sent out twenty-eight ounces of gold and concentrates.——The Iron placer has commenced operations for the season.——The John Bull tunnel is in 200 feet.——A mill for the Ione property is contemplated by the operators, Mode & Penn, Red River.

The Old Reliable mine at Golden has four 80-foot shafts all in mineral. They crush fifteen tons per day of $8 ore.

ARIZONA.

At Tucson last Wednesday the case of the United States against the Copper Queen M. Co. was determined in favor of the defendants. The Government claimed $183,000 for timber used by the Copper Queen. This was the third trial. The decision is considered fair and favorable to mining interests.

At Prescott the Gold Standard group in the Santa Maria district was sold to J. B. Greenhut and others of Peoria, Ill. They have been working the property under bond for some time and have a mill and cyanide plant in operation. The bond had a year to run, but the developments proving satisfactory, they decided to close the deal at once, to secure full possession and enlarge the operations.

B. F. Pritchard is operating with other parties in the development of copper properties on the lower end of the Bradshaws.——There are 390 stamps in the county of Yavapai, of which the following are known to be in operation: Congress, 40; Santa Maria, 20; Little Jessie, 20; Stanton, Crowned King, Richenbar, Providence, Lottie, McCabe, Sundance, Etta, Heuston & Hull, Ora Bonita, Morning Glory, Pine Mountain, Gladiator, Pickerells, 10 each; on Lynx creek, 40; Pratt, 5; Storm Cloud and Emmett, 2 each.——J. Roberts has an 18-inch ledge on his Ida May mine, in Yavapai county, which goes $30 per ton in gold.——Chicago people have leased several properties near Azurite and have put on a force for development.——Mohave county has three new 10-stamp mills which will crush ore from the Klondyke, Sheep Trail and O. K. mines.——A 3-foot streak of ore has been found in the Erie mine, Cedar district, Mohave county.——The ore from the Nighthawk mine, in Mohave county, owned by McMahan & Davis, runs 1000 ounces in silver and 15 ounces in gold per ton.——J. Uncapner has purchased the property of the Garden Springs M. Co., consisting of the Keystone mine and mill and the Ithica mine.——The Kingman Gold M. Co. has been organized to develop properties near Cedar which are said to have enough ore in sight to justify the erection of a 10-stamp mill.

The Phœnix *Republican* says that the Burro and Telegraph mines, on Burro creek, have been sold to W. H. Day of Denver for $15,000.——The Saginaw M. Co. has purchased the Twin Butte copper mines, near Butte, for $60,000. —— L. Kimmerly is developing a quartz property near Meyers' Well which assays from one-fourth to two ounces gold per ton.——Work at the Golden State Copper Co.'s mines in the Dragoons is progressing.——The Marshall copper property, near Globe, comprising four claims, at a depth of 160 feet has a body of ore that assays 50 per cent copper. A company has been incorporated in New York, known as the Live Oak Copper M. & S. Co., that will begin development work at once.

MEXICO.

Two Republics reports a strike at the San Pablo mine in Pachuca. The ore runs forty ounces of silver to the ton, with a small indication of gold. —— A company headed by F. Horton of Cleburne, Texas, will open placer properties near Pihuamo, Jalisco. They contemplate operating extensively with hydraulic machinery.

Coast Industrial Notes.

—The rolling mill of the Los Angeles, Cal., Iron and Steel Co. has been leased by A. V. Chown and others, with an option of purchase.

—Twenty-seven carloads of oranges were shipped from Redlands, Cal., during the week ending June 2. The total shipments to date are 1334 cars.

—For the ten months ending April 30th the gross earnings of the Oregon Railroad & Navigation Co. showed a gain of $1,636,216; net earnings increased $807,663.

—Work on the Cascade tunnel of the Great Northern Railroad, Wash., is progressing. From the east portal the tunnel is now in 800 feet; from the west portal, 600 feet.

—Mexico has exported $2,000,000 worth of precious metals per month since January 1st. Four-fifths of Mexican exports are to the United States, which supplies Mexico with one-half of all its imports.

—Los Angeles, Cal., has voted to issue $150,000 in bonds for increased fire protection and $23,000 for bridge-building purposes. The bonds will bear 4 per cent interest and run forty years.

—The South Yuba Co. is preparing to put in an additional electric power plant in Placer county, Cal., to act in connection with that near Newcastle, to meet increased demands for power and lights at Sacramento.

—The advancement of the mining industry in Jalisco, Mexico, is ascribed to the unusual influx of modern machinery, for the most part American, and the reopening of buried Spanish mines in various parts of the States, mainly by American capitalists.

—A stock company, said to be backed by London, Berlin, Amsterdam and American capitalists, controlling $25,000,000, has been incorporated under the laws of the State of Washington for the construction and operation of a railroad to extend from a point on one of the northern sounds of Alaska to the interior, a distance of 100 miles.

—Though the frosts damaged a portion of the oranges in southern California, the crop of the season drawing to a close will amount to considerably more than 12,000 carloads. Conservative people, who have given some study to the question, believe that if the crop of next season is not damaged by frost it should amount to 20,000 carloads, or over 100 carloads a day for six months in the year.

—Armstrong, B. C., contemplates waterworks and an electric light system. Money has been raised to complete a survey from the creek, about two and one-half miles from the town, and it is estimated that for the comparatively small sum of $8600 satisfactory systems can be introduced. It is proposed to raise the required money by a twenty-year loan, pledged by the municipality.

—The Southern Pacific R. R. Co. has filed at Oakland, Cal., articles of consolidation, amalgamation and incorporation of the Southern Pacific, the Northern Railway, the Northern California Railway and the California Pacific Railway Companies. The new corporation controls fifty-three lines of railroad, aggregating 4535 miles of rail and is capitalized for $125,455,000. The directors are the same as those of the Southern Pacific Co.

—A cablegram received at Vancouver from London states that a cable is to be constructed from Vancouver to Dawson via Skaguay, Dyea and Wrangel. M. Eschevege at Vancouver represents the Vancouver Anglo-French Telegraph Co., who are to construct the cable under a capitalization of half a million pounds sterling. The cablegram instructed Eschevege to survey the route and clear the right of way at once. The cable is in process of manufacture in England. It is to be a private commercial enterprise, unaided by the Government.

—The receiver of the Seattle Coal and Iron Co., in his report for the three months ending April 30th, shows:

Coal sales	$66,548 89
Rents	256 25
Interest	74 60
Store	1,350 00
Total earnings	$68,229 74
Mining expenses	$38,580 41
Officers, clerks and office expenses	1,773 70
Freights	12,529 95
Retail agency expenses	2,225 75
Royalties	1,144 68
Taxes	215 23
Insurance	137 87
Total expenditures	$56,597 59
Assets	$66,031 95
Liabilities	34,134 24

—From the Canadian government comes a new order by which Canadian goods carried in American vessels from Canadian ports to Alaskan ports, and there transhipped to ports in the Northwest Territory, will be admitted free of duty. American goods upon which duty has been paid to Canada, carried subsequently by American vessels from Canadian ports in Alaska, and there transhipped to places in the Northwest Territory, will also be admitted free of duty. The section that applies directly to us is as follows: "Goods purchased in Canada, duty paid or free, and goods or produce of Canada which are carried to Alaska free of United States custom duty, may be admitted into the Northwest Territory free of Canadian custom duties, when shipped from ports in Canada, under regulations prescribed by the Minister of Customs, provided that the identity of the goods shall be established to the satifaction of the collector of customs at port of entry."

—The San Diego, Cal., *Union* says that Pittsburg men have undertaken the development of the sulphur deposits in Lower California, near the head of the gulf, and will build a railroad from Yuma to San Diego, with a branch connecting with the sulphur mines. The syndicate, so far as its operations in Lower California is concerned, is known as known as the Mexican Sulphur M. Co. The Mgr. is J. A. Dubbs of Ventura. The mines are twenty miles above the mouth of the Rio Colorado, near the Hardy. These deposits are a series of low hills or part of an extinct crater. The sulphur is found in masses having a higher percentage than any body known. The deposits are on the flat desert, in one of the hottest portions of the earth's surface.

—The victory at Manila compels occupation of the Philippines for an indefinite period, and will result in the trade between the United States and the Islands being carried on by means of American ships. All our commerce with the Philippines now goes in British ships and balances are settled through London. With the Islands in possession of and governed by the United States, it will have to go in American vessels and the exchange will be direct. "This," says the New York *Commercial Advertiser*, "is what we have been struggling for for years. We have been struggling to sustain a languid merchant marine on the Pacific coast with subsidies." When, as is coming with swift strides, Pacific shipping shall have a monopoly of the trade between this country and 10,000,000 people, with a commercial capital of 300,000, it will grow like a mushroom over night. Steamship lines to Manila will appear by magic, and tramp steamers and sailing ships will keep down rates by competition. In a few years we shall have an ocean-carrying trade with the East rivaling the China trade of fifty years ago, and direct exchange with Manila will give us banking as well as freight and insurance profits. But nobody supposes that American steamship lines to Manila would stop there, only 600 miles from Hongkong, 1500 from Yokohama, India and Australia, and in the very thick of the East Indian islands. From this central station we should reach out for trade in every direction. Our own ships, instead of British, would carry wheat, cotton, petroleum and manufactures to Japan and China, India and the Islands, and bring back tea and fabrics, hemp and jute, rice and coffee from Ceylon and coal from Australia. With the tremendous advantage of the Philippine and Hawaiian monopoly, we should soon take the lion's share of the trade between the United States and Asia—a trade of which the present sees only the paltry beginning.

—Director of the Mint Roberts is at Seattle, Wash., arranging for the assay office to be established there. He says: "The Seattle assay office will receive deposits of gold precisely on the same terms as govern the reception of gold at the United States mint. All bullion is shipped to a mint at the expense of the Government, while the Government does not share any of the expenses incurred in the transportation of gold to an assay office. Under the terms of deposit which will govern the Seattle assay office, and are now in vogue at the other assay offices of the country, the miner will deposit his gold and it will be weighed in his presence, after which he will be given a receipt. The gold will then be taken to the smelting room and treated for the purpose of eliminating the foreign substance. After the foreign substance is eliminated the gold is then cast into a bar of rectangular form, and two assayers are put to work on it. One of the assayers takes a clip of gold from one end and assayer No. 2 performs a similar operation on the other end. If the assays agree or conform with each other, the bar of gold is presumed to be of the same fineness all the way through. If the assays disagree, the bar is again sent to the smelting room for treatment, and the same operation is gone through until such time as the two assays agree. The miner is paid substantially the amount that his gold reresents in coin, there being only a few slight charges for the treatment of coarse gold. It can be said, though, that the miner is paid substantially what his gold represents in money. Payment at the assay office will be made in drafts on the United States government, which are usually worth par at any bank, while at the mint the depositor has the privilege of being paid in coin made out of his own coin if he desires. The system which governs the operations of a mint would not be practicable at any assay office, as money is not coined at an assay office. The assay office in Seattle will be in operation by July 10: The other assay offices and their annual receipts are: Denver, the most important in the country, $12,000,000; Charlotte, N. C., and St. Louis, about $250,000 each; Helena, Mont., $2,000,000; Boise City, $1,400,000; Carson City, $650,000. It will be readily seen that the entire force in the office will not be new to the business. The directors of the mints have just recommended the abolishment of the mints at Carson City and New Orleans on the grounds that they do not receive enough bullion, and a mint to cost $500,000 is to be erected at Denver. I believe that three mints—one at Denver, Philadelphia and San Francisco—are adequate to the demands of the country."

Recently Declared Mining Dividends.

Wildman-Mahoney, California, 10 cents per share; payable immediately.

Silver King, Utah, 25 cents per share; June 10.

Morning Star, California, $5 per share; payable immediately.

Swansea, Utah, 5 cents per share, $5000; June 10.

Pennsylvania, 5 cents per share, $2575; payable immediately.

War Eagle, B. C., 1½ cents per share, $30,000; payable immediately.

Victor, Colorado, 50 cents per share, $100,000; June 3.

Calumet & Hecla M. Co., Mich., $10 per share; payable June 30—a total to date of $53,850,000.

Osceola C. M. Co., Mich., $1 per share; June 10.

Personal.

W. CHYNOWETH is now Supt. McCarthy mine, Keswick, Cal.

T. T. LANE continues in charge of the Lane mines, Ely, Nevada.

W. J. HARRIS is appointed Gen. Mgr. B. C. F. Co., Rossland, B. C.

A. J. LAUTERMAN becomes Gen. Mgr. Iron Crown mine, Lewiston, Idaho.

E. L. MONTGOMERY has been appointed Supt. Utica mine, Angels, Cal.

H. N. NELSON has been appointed Supt. Jordan mine, Mono Lake, Cal.

D. FRICOT, owner Independence mine, Grass Valley, Cal., is in San Francisco.

JNO. OWEN is the new manager of the Sun & Moon M. Co., Idaho Springs, Colo.

L. L. MEYERS, Supt. Malakoff mine, North Bloomfield, Cal., has returned home.

ROSS E. BROWNE, accompanied by R. McKenzie and Karl Hoffman, is examining the German mine, near Washington, Cal.

D. C. STAPLETON who recently examined mining properties in northern California and southern Oregon, has gone to London.

SECRETARY OF THE INTERIOR BLISS expects to be present at the International Mining Congress at Salt Lake, Utah, next month.

PROF. JAS. S. KEELER, recently of Allegheny, Penn., assumed the position of director of the Lick, Cal., Observatory this week.

IRVING M. SCOTT, of the Union Iron Works, left New York City for St. Petersburg, Russia, on the 7th inst. He expects to be absent three months.

W. R. CHADBOURNE, Gen. Mgr. Mikado mine, Leadville, Colo., is examining the Lindsay mine, Maybert, Cal., with a view to bonding it for his company.

R. A. F. PENROSE, Pres. Commonwealth, Arizona, G. M. Co., who recently bought the Juniper mine, Cochise Co., Arizona, for $75,000, is examining mining property at San Bernardino, Cal.

CURTIS H. LINDLEY has returned from Washington, D. C., where, before the U. S. Supreme Court, he brought to a successful issue two mining cases fully reported and illustrated on pages 613, 614 and 615.

DIRECTOR OF THE U. S. MINT ROBERTS is visiting this coast. He says: "I predict that the entire gold output of the country during the present year, inclusive of Alaska, will reach $100,000,000. South Africa is running us a very close race. In 1897 the output of that country was only $2,000,000 behind the United States, and I have been advised that during the first part of 1898 the Rand district was running 50 per cent ahead of last year. The present gold production of the world is far ahead of both the gold and silver production a few years ago. In 1873 the gold and silver production of the world was about $180,000,000, while the production of gold alone is now $300,000,000."

IN addition to the delegates to the Mining Congress at Salt Lake City, Utah, next month already selected by the California State Mining Association and other bodies, Gov. Budd, last Wednesday, appointed the following delegates. H. W. Duncan, U. S. G. Todd, C. C. Wright, Los Angeles; M. F. Tarpey, Alameda; W. F. Prisk, Grass Valley; T. T. Lane, Angel's Camp; James McMurry, Weaverville; Dr. Frank Bosqui, Bodie; D. C. Reid, Redding; J. H. Neff, Colfax; J. F. Parks, Jackson; T. R. Bard, Hueneme; E. C. Chapman, Taylor mine; Mrs. C. H. Church, Princess mine, Coutolene, Butte county; J. M. Gleaves, U. S. Surveryor-General; Louis Glass, S. K. Thornton, A. B. Paul, J. D. Siebe, J. E. Doolittle, J. V. Coleman, San Francisco; James O'Brien, Smartsville; J. E. Sexton, Placerville; F. R. Wehe, Downieville; J. Ross Jr., Sutter Creek; E. M. Preston, Nevada City; F. F. Thomas, Gwin mine, Calaveras Co., W. F. Detert, Jackson.

Commercial Paragraphs.

C. B. BOOTHE & Co. of Los Angeles, Cal., have furnished the Consolidated Water Co. of Pomona, Cal., with the largest pneumatic lifting pumping plant ever erected in southern California.

AN air compressing plant recently installed at the Alaska-Treadwell mine, Douglass island, Alaska, includes what is said to be the largest Pelton water wheel in the world. In this installation a duplex-Riedler compressor with 24-inch cylinder is driven by a horizontal, cross-compound condensing engine, with 24-inch and 36-inch cylinders and 36-inch stroke. The steam cylinders are placed behind the air cylinders, and the piston rods are provided with couplings. Instead of the usual flywheel, a Pelton water wheel, built by the Pelton Water Wheel Co. of San Francisco, is mounted on the compressor shaft. It is 22 feet in diameter, weighs 25,000 pounds, and will, when running under a head of 480 feet at its normal speed of seventy-five revolutions per minute, develop 500 H. P., delivering 28,000 cubic feet of pure air per minute. The largest water wheel previous to this is operated by the North Star Mining Co., Grass Valley, Cal., and is 18 feet 6 inches in diameter. When from any cause it becomes necessary to shut off the water, the piston rods are connected and the engine is started.

PACIFIC COAST manufacturers are getting deserved and widespread advertising in these days of war and big Government purchases. Recently the official purchasing agent in charge of the Manila expedition, realizing the necessity for ice in the Philippines for the 25,000 soldiers to be sent from San Francisco, inquired of Manager Graham of the Vulcan Iron Works, 505 Mission St., San Francisco, as to the feasibility of his promptly furnishing an ice-making plant. That gentleman immediately demonstrated the ability of the Vulcan Works in that direction, and the order was placed for an ice-making plant with a capacity of 5000 pounds of ice every twenty-four hours. The specifications provide that the ice must be of the best quality and chemically pure—that is to say, made of distilled water, for which purpose a distilling and purifying apparatus is to be provided. With the aid of this latter apparatus pure and wholesome ice is insured, no matter what may be the quality of the water supply. The plant will furnish the ice in blocks 8 by 12 by 36 inches, and weighing about 100 pounds. A steam engine, direct connected, operates the ice machine, and the steam is supplied by a 20 H. P. portable boiler placed on skids. The machine is of the Vulcan vertical duplex cylinder, single acting type, so arranged that either cylinder may be used alone in case of accident to the other. The Vulcan ice machine is in use on the following steamers of the Philippine expedition, viz.: City of Peking, City of Sydney, Colon and Zealandia. The order went naturally to the Vulcan Iron Works, because the Vulcan Iron Works' ice machines have been thoroughly tested in tropical and other climates, and are in use in California, Oregon, Washington, Arizona, New Mexico, British Columbia, Mexico, Central America, South America, Hawaii and many South Pacific islands. These works have developed a large and successful business in the line of ice and refrigerating machinery, covering every size of machine, and are able to give such strong references as the Mountain Copper Co., Keswick, Cal.; Kern County Land Co., Bakersfield, Cal.; Hawaiian Commercial and Sugar Co., San Francisco, Cal.; Gambrinus Brewing Co., Portland, Or.; Hotel del Monte, Monterey, Cal.; and Pacific Mail Steamship Co., San Francisco, Cal. The Government ice plant goes to Manila by swift steamer next week, with three machinists from the Vulcan Iron Works.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING MAY 31, 1898.

604,953.—METER DIAL—C. L. Arques, San Jose, Cal.
604,961.—TWINE HOLDER—F. Bossong, Ellensburg, Wash.
604,962.—AIR COMPRESSOR—E. Bottini, S. F.
604,876.—CYCLE HANDLE BAR—E. H. Chappuis, Marysville, Cal.
604,825.—MUSIC LEAF TURNER—C. Gittus, Jr., Golden Gate, Cal.
604,826.—CONVERTING MOTION—A. Hadsall, Mapleton, Or.
605,044.—OPERATING ELEVATORS—C. I. Hall, S. F.
604,985.—SPIRIT LEVEL—J. Hartford, S. F.
605,045.—HORSE CONTROLLER—G. A. Hidden, Phœnix, Ariz.
604,991.—STOVE—Litchfield & Baugher, Spokane, Wash.
604,838.—BICYCLE FRAME—J. R. Nagell, Tacoma, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CYCLE HANDLE-BAR FASTENING ATTACHMENTS.—Edward H. Chappuis. No. 604,876. Dated May 31, 1898. This invention relates to a means for securing the handle bars of bicycles with reference to the handle-bar post, to which they are attached, so that the handle bar may be turned with relation to the post to adjust the ends to varying elevations, and a means for locking this adjustment at any desired point. It consists essentially of a vertically movable handle-bar post, which is slidable in the socket within which it fits. This post is locked at any desired point by means of a cam lever which engages with corrugations, thus enabling the handle bar to be raised or lowered by simply turning the cam lever in one direction to free it and in the opposite direction to lock it as soon as it is adjusted. The handles are usually curved in various ways, and it is often desirable to raise or depress the ends of the handles without raising or depressing the central portion which connects with the post. This is effected by means of corrugating clamping disk faces upon each side of central disks similarly corrugated and fixed to the handle bar. Between the backs of these disks is a wedged-shaped ring which is turnable by means of a cam lever, so as to release the locking disks to allow the handle bar to be turned, and the lever may then be pushed back to clamp the disks with the bar in its new position. This adjustment is easily made, even without stopping or dismounting. The whole is covered with a slide or collar, which keeps it clear from dust.

Recent California Mining Incorporations.

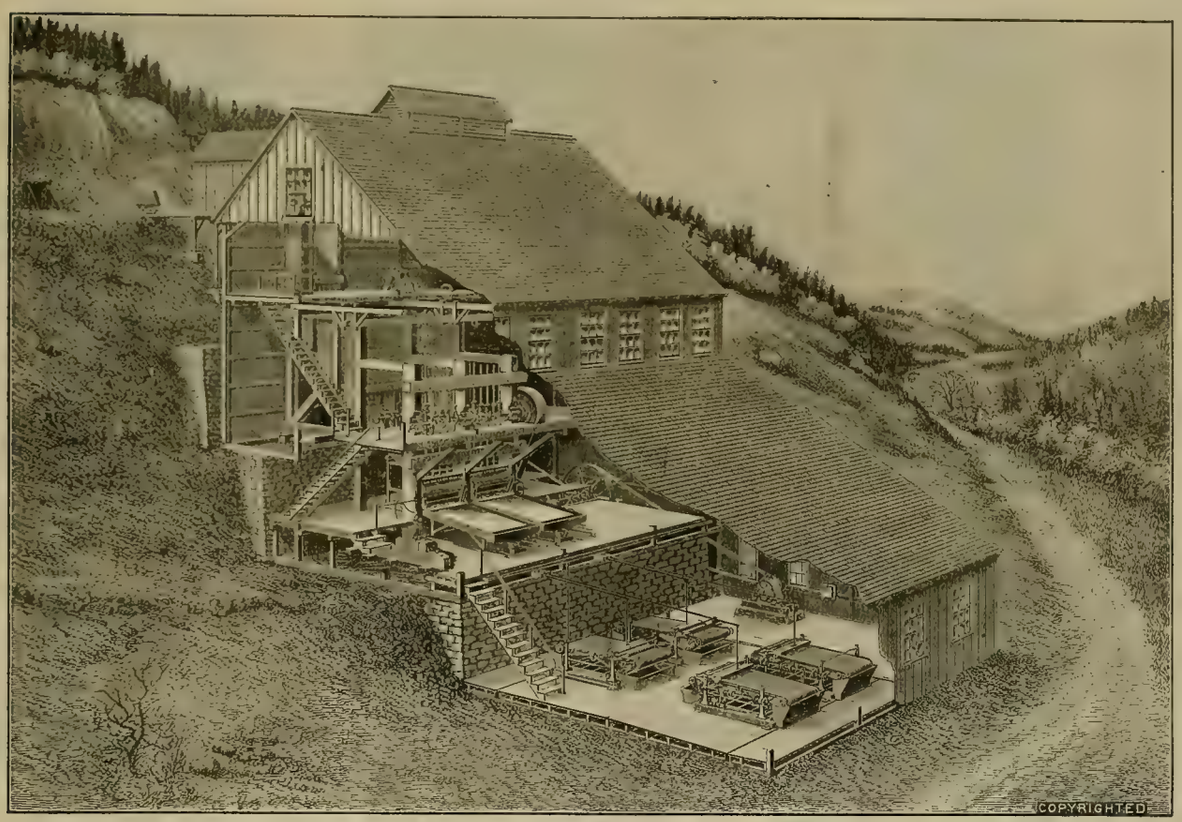
Sheep Ranch G. M. Co., Stockton; capital stock, $600,000; subscribed $700; W. H. Clary, B. F. Langford, G. R. Fletcher, G. F. Volz, C. A. Kern, L. Schumacher, C. L. Feusier.

Desert Queen M. & M. Co., Los Angeles; capital stock $100,000, subscribed $35,000; R. M. McCabe, L. Montgomery, A. G. Refenburg, J. L. Asay, J. R. Chace, W. R. Porter, W. C. Morton.

La Victoria M. Co., San Francisco; capital stock $100,000, subscribed $50; G. Sillesen, J. E. Froid, J. F. Myers, F. A. Hatch, J. G. Chown.

UNION IRON WORKS,

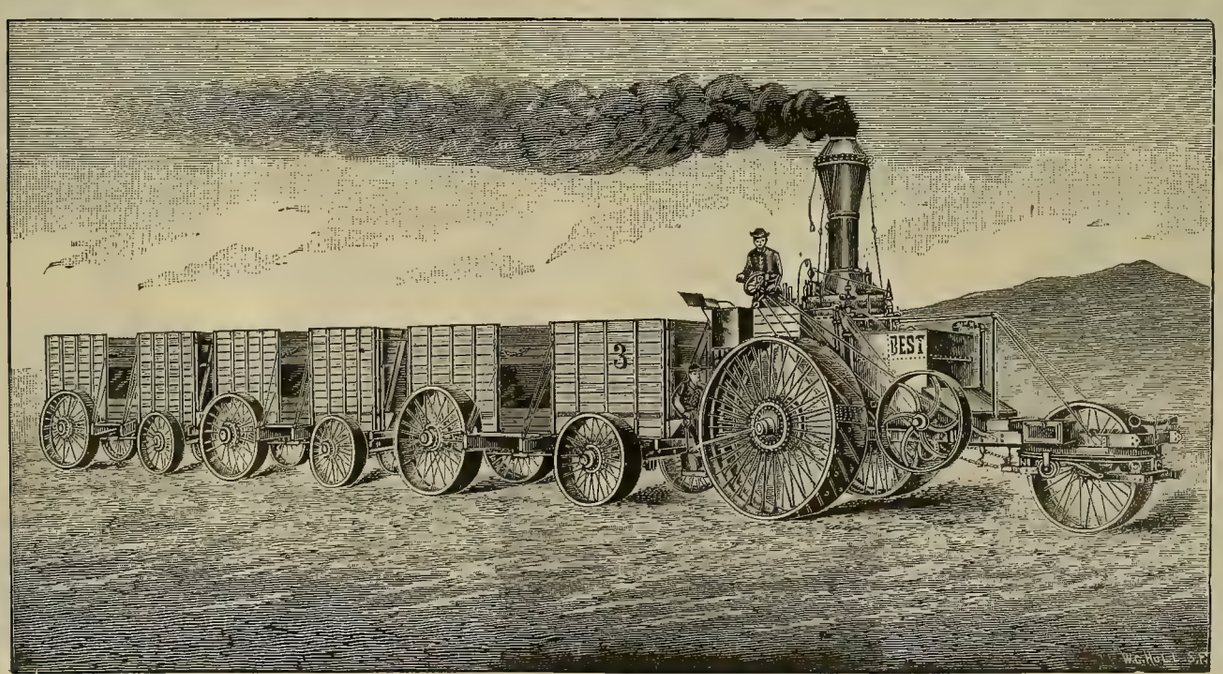
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The most powerful and only Successful and Practicable Road Engine in the World. Over sixty of them in use in this State, and they are being Successfully and Profitably Employed in Hauling Logs Lumber, Ore, Salt, Borax and other kinds of freight.

The work is being done **FIFTY PER CENT** Cheaper than it is possible to do with Animal Power. They can be operated over any ordinary road where it is practicable to use mules or horses, doing the same work. They can ascend or descend grades as much as 20 to 30 inches to the rod, hauling their loads of 35 to 40 tons, depending upon the condition of the roads; loads may be increased to even greater amount on moderately level roads.

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115½ N. Main St., Los Angeles, Cal.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

D. H. JACKSON,
Placerville, California. Cable address, Ixa.
MINING ENGINEER.
Reports on Mines and Methods of Ore Treatment. California Mines Specialties.

BERNARD MACDONALD,
Consulting Mining Engineer,
BUTTE, MONTANA.
Codes: Bedford McNeils and Moreing & Neils.

BERTRAM HUNT, F.I.C. F.C.S.
Chemist and Metallurgist.
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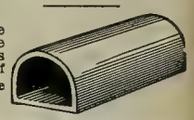


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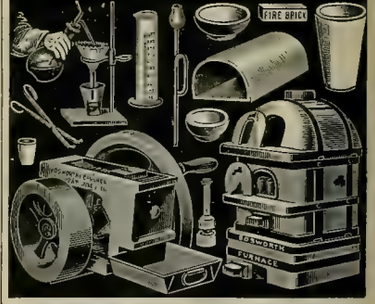


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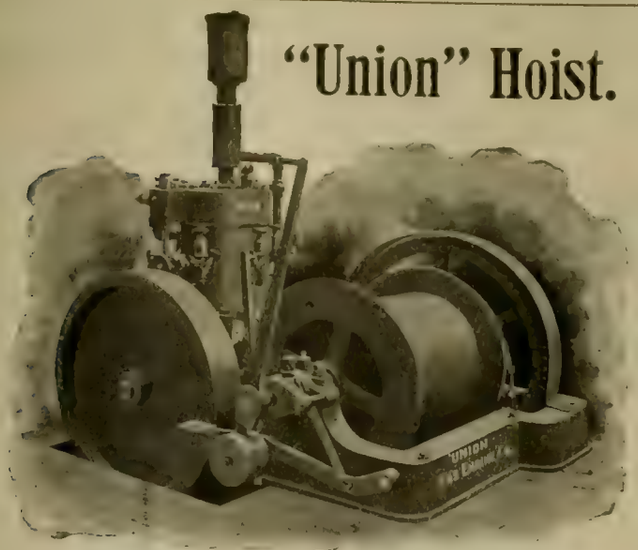
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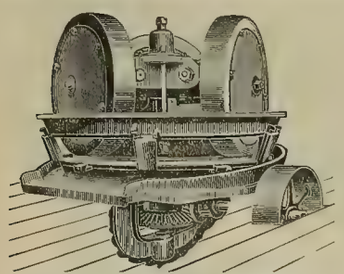
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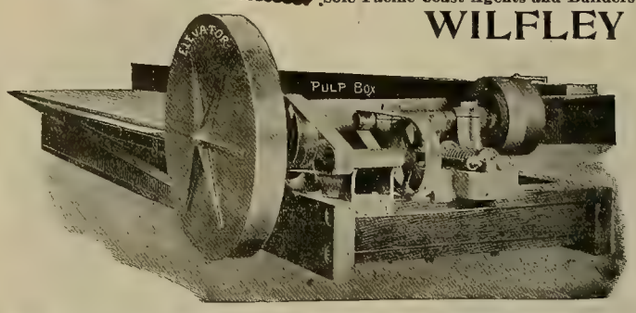
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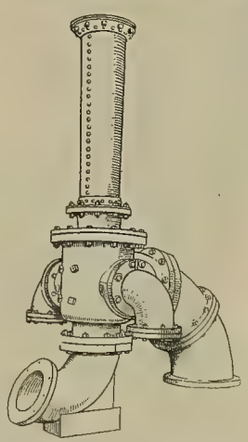


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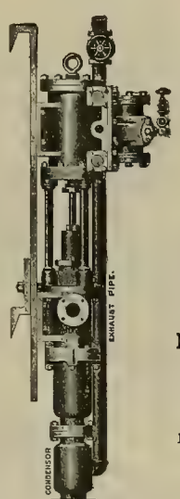
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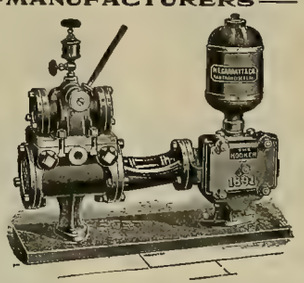
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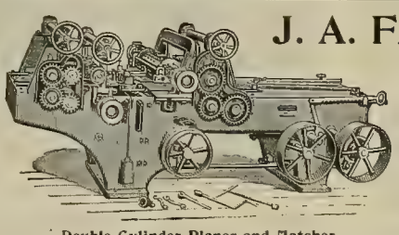






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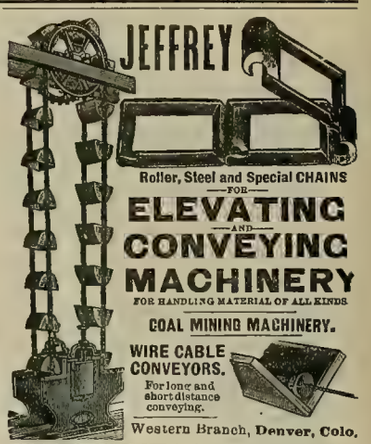
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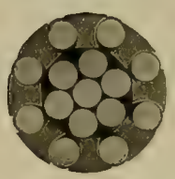
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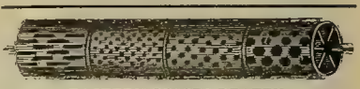
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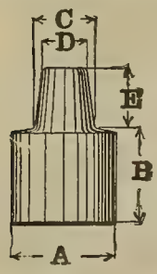


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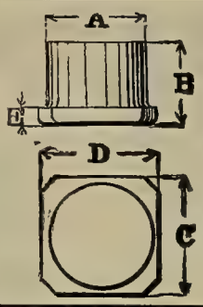
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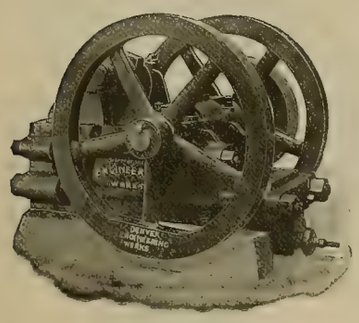
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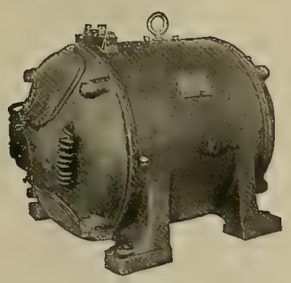


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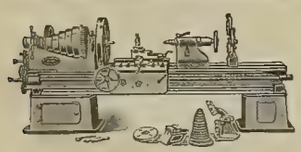
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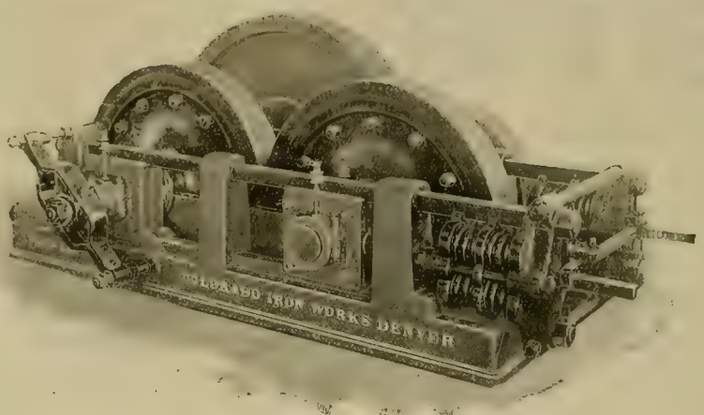
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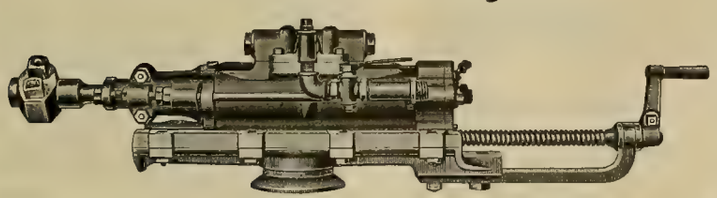
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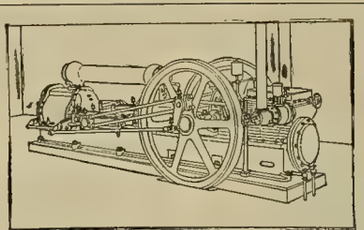
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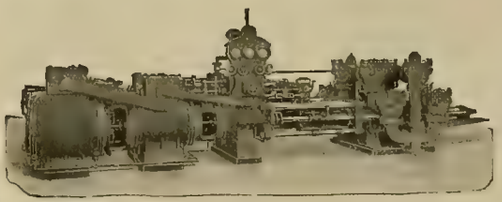
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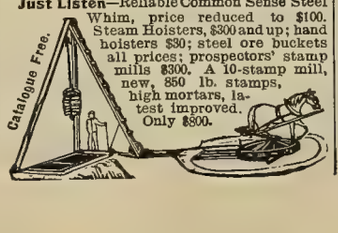
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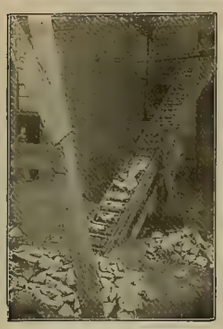
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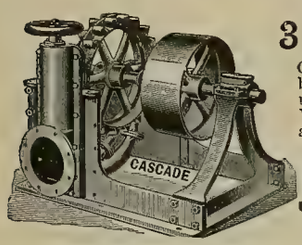
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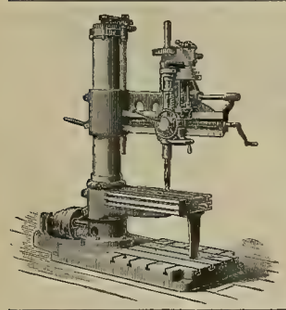


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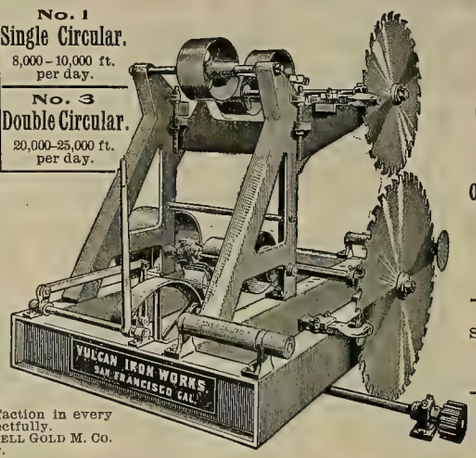
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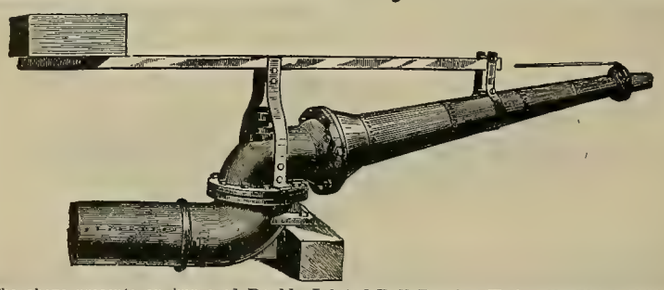
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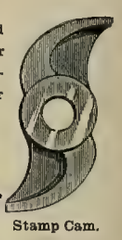

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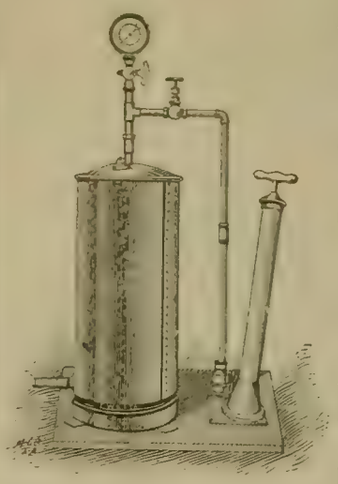
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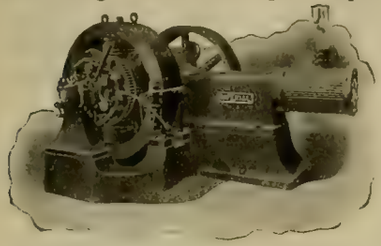
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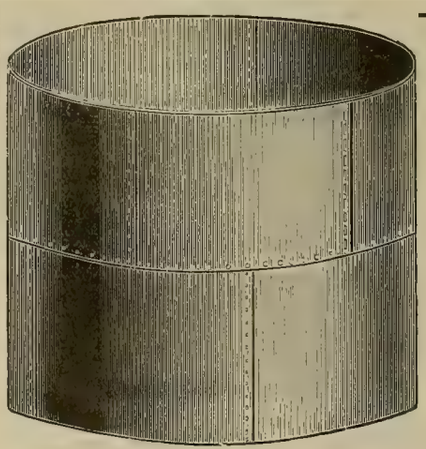
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Market Reports.

The Markets.

SAN FRANCISCO, June 9, 1898.

Coupled with local activity in supplying the 15,000 soldiers camped here is a general expectancy in all industrial lines "after the war is over," which event is of indefinite date. Money is easy. During the week over $500,000 advance of the proposed 3% Govt. loan was subscribed for. There are just expectations of increased Pacific coast trade in the probable event of retention of the Philippines by the U. S. Government.

The principal trade event of the week is the action regarding freight rates. On the 25th inst. a new transcontinental freight rate goes into effect, of interest to the coast. There is a general advance. Per 100 lbs., Babbitt metal is advanced from $1 to $1.50 in less than carloads and from 80 cents to $1, carloads, from all points. Brass goods, including butts, bolts, castings, faucets, hinges, nails, rivets, tacks, blanks, screws, door rails, brass ingots, pipe, tubes, flues, plate and shunt brass, rods, valves and fittings, show an advance of from 40 to 50 cents per 100 lbs. on less than carload lots, and from 10 to 15 cents per 100 lbs. in carload lots. Copper goods, including bar, ingot, cast plate, bolts, nails, pipe, tubes, rods, plate and sheet copper, etc., are advanced from $1, less than carloads, to $1.40 and $1.50, and from 80 cents, carloads, to 90 cents and $1.

Hardware, less than carloads, advanced from $1 and $1.20 to $1.50, $1.75, $2.20 and $2.60. Iron and steel (articles of), less than carloads, advanced from $1 to $1.10, $1.25 and $1.50. Machinery, set up, advanced from $3.60 to $4.50, less than carloads. Same, knocked down, in pieces, advanced from $2.40 to $3. Same, completely knocked down and boxed, advanced from $2.15 to $2.60.

Nails and spikes, less than carloads, advanced from $1 to $1.25@1.35.

Powder, gun and black blasting powder, carloads, advanced from $1.70 to $2.

New York quotes: Lake copper quiet, $11.90 bid, $12.10 asked. Tin firmer, $15 bid, $15.10 asked. Spelter unchanged, $4.35 bid, $4.45 asked. Lead steady, $3.72 bid, $3.77 asked. An advance in lead is naturally looked for. The same market quotes silver 59⅛, London 27⅛, San Francisco 59¼.

In metals local quotations are Tinplate, $3.50; English, to arrive, $4.25; Pig Tin, 16c ℔ lb; Yellow Metal, 13@13½; Lead Pipe, 5½ @6; Sheet Lead, 6.2@7c ℔ lb.; Pig Iron, American Soft, $20.00@22.00; Scotch, $20.00@ 23.00 ℔ ton.

Yard prices on Coast Coal, to dealers, are: Wellington, $8.00; Seattle, $6.00; Coos Bay, $5.00; Southfield, $7.50.

Last week's quicksilver quotations are unchanged; an advance is considered probable. In chemicals, large lots, current quotations are: Bi-carb. Soda, English, $2.40@2.50; Hyposulphite of Soda, $2.50@2.60; pure Caustic Potash, $8@11; Saltpetre, refined, $6.75@7.00; Nevada Soda, $1.50@1.90; California Bi-Carb. Soda, $2.40@2.50; California Muriatic Acid, $3.50@4.00; California Sulphuric Acid, $2.25@ 4.00; Sulphur, Cal., sublimed, $2.50; Copperas, 80@85c; Sulphate of Zinc, $6; Cyanide, 30@ 32c; Borax, 5@6c ℔ lb.

Mining Share Market.

SAN FRANCISCO, June 9, 1898.

The summer lull and a war diversion was marked this week solely by a little rise in Sierra Nevada, selling up to 75, Caledonia also showing a little life. To illustrate the present slender volume of business it is only necessary to cite this morning's session of the San Francisco Board, when 260 shares of stock were sold—a shadow of former business.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 9, 1898.

9:30 A. M. SESSION.

300 Best & Belcher	20	100 Ophir	27
200 Caledonia	25	100 Savage	05
200 Challenge	22	500 Sierra Nevada	57
200 Con Cal & Va	43	500 Union	07
300 Gould & Curry	15	100 Yellow Jacket	21
100 Mexican	15		

SECOND SESSION—2:30 P. M.

100 Ophir	28	150 Union	05
50 Gould & Curry	13	300 Caledonia	25
300 Con Cal & Va	42	100 Challenge	22
200 Sierra Nevada	56	200 Occidental	65

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage.

Money loaned mines.

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Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated.

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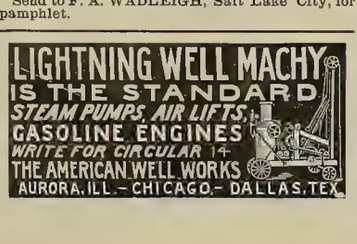
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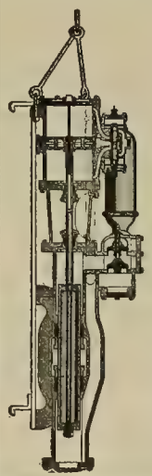
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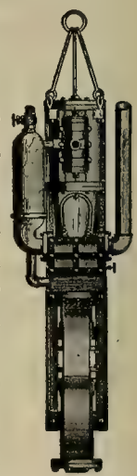
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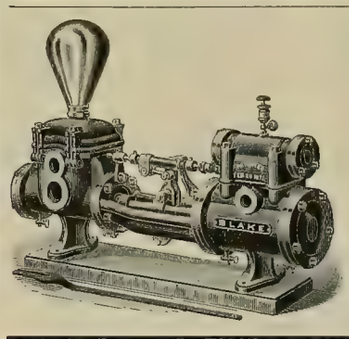
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Assessment Notices.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1898, an assessment (No. 19) of three cents (3c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 106 Leidsdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of July, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 3d day of August, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidsdorff street, San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California

Notice is hereby given that, at a meeting of the Board of Directors, held on the 10th day of May, 1898, an assessment (No. 1) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 213 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of June, 1898, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 5th day of July, 1898, to pay the delinquent assessment, together with the costs costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson St., San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 916 Market street, Room 57, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of June, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 23rd day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—No. 916 Market street, Room 57, San Francisco, California.

LEON GOLD MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, near Winchester, Riverside County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 1) of 1½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Room 7, fifth floor, Mills building, San Francisco, California.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Red Cap District, Humboldt County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 27th day of April, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Harvey M. Binckley	2	1	2 00
Alice E. Binckley	20	4	8 00
Alice E. Binckley	23	20	40 00
Alice E. Binckley	24	20	40 00
Alice E. Binckley	25	20	40 00
Alice E. Binckley	26	20	40 00
Alice E. Binckley	39	1	2 00
Alice E. Binckley	40	2	4 00
Caroline S. Townsend	18	20	40 00

And in accordance with law, and an order from the Board of Directors, made on the 27th day of April, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 125 Beale St., San Francisco, California, on MONDAY, the 27th day of June, 1898, at the hour of 3 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

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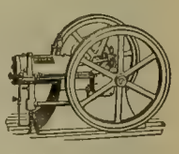
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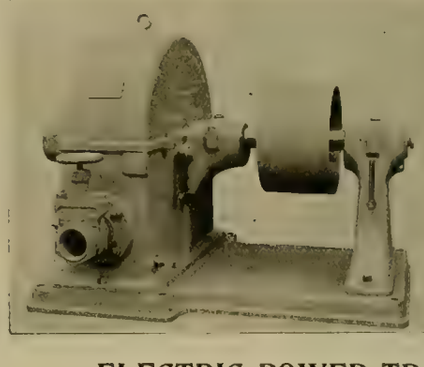


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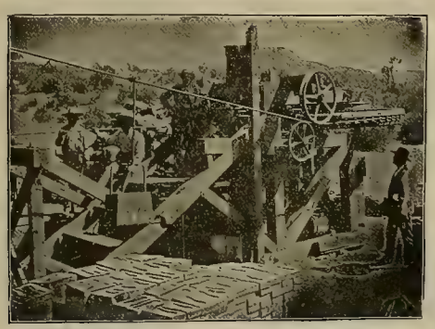
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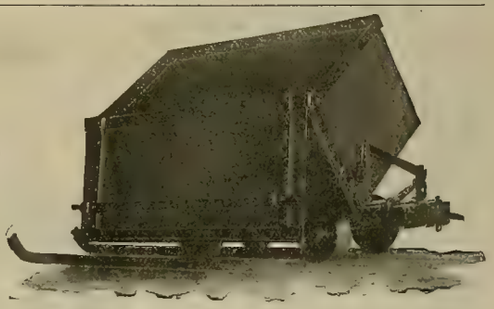
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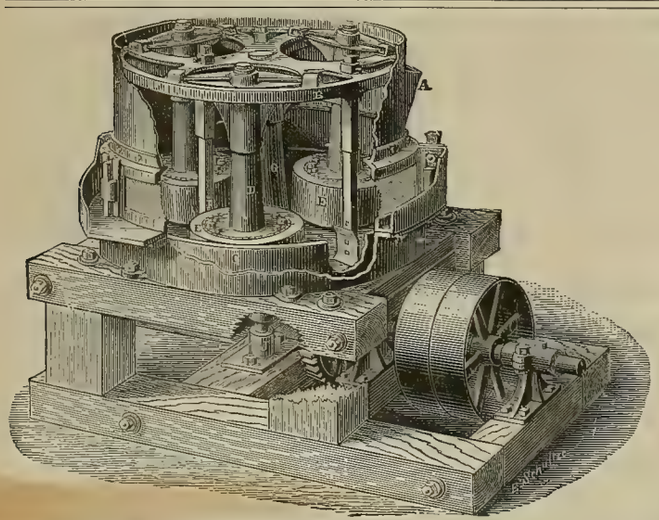
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FOR THE CONVENIENCE OF OUR READERS IN THE MINING CO[illegible]VE PRINT IN legal size, 12x36 inches the Mine Bell Signals and Rules provided for [illegible]e Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco.

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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 1980.—VOLUME LXXVI. Number 25. SAN FRANCISCO, SATURDAY, JUNE 18, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A Big Cyanide Plant.

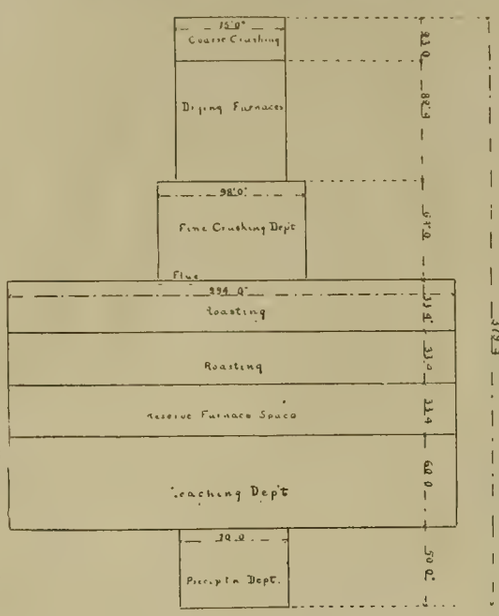
At Mercur, Utah, has begun operation of what in many ways is the most remarkable cyanide plant on the continent. About $1,500,000 has been expended on mine and machinery. Reference is made to the Golden Gate mill at the mine of the same name, at Mercur, the property of J. R. De Lamar.

Utah is a land of marvels, and has often set at defiance long accepted tenets. The finding of gold in coal, the discovery of silver in sandstone, and the production at Mercur of gold ore in which there is not a trace of silver, are among the singularities. Ordinarily gold bullion contains about 10% silver. A remarkable feature of some Mercur gold ore is the total absence of silver. The district was first a silver producer, free-milling chloride, soon exhausted; then cinnabar was discovered in an overlying vein; lastly gold. Many thousand dollars were lost in abortive attempts at pan amalgamation at the Mercur mine which only secured 15% of the gold, when, in '92, the cyanide process was tried and found successful. At the Mercur, Marion and Geyser mines this process was profitable, with a use of one-half pound of cyanide per ton of ore. Sulphides and arsenical ores in the Golden Gate property and the group by which it is surrounded occasioned experimental work lasting for many months, which has resulted in the building of the biggest institution of the kind in the country.

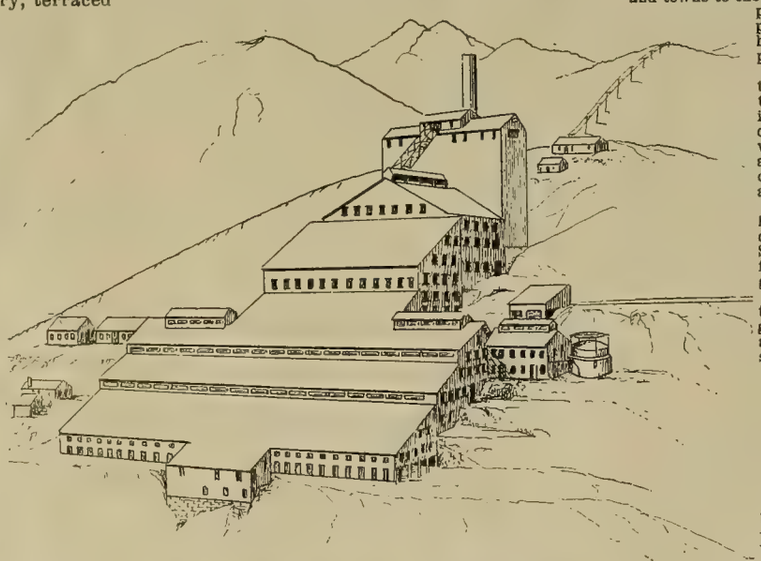
The site covers an area 300x400 feet; in the foundation is cemented 8000 tons of masonry, terraced till, were it reared perpendicularly, the height would be 300 feet above the earth. The mill building, of steel, is 160 feet from the lowest to the highest floor level, and is 380 feet long by 295 wide. On the top or upper level is a Gates crusher, 25x75 feet. The ore is raised through an incline which starts from the working shaft about 60 feet below the surface, and passing up under a corner of the mill, is automatically dumped into the coarse crushers and run into bins holding 2000 tons. The dryer on second level rests upon solid masonry 40 feet thick, with a floor space 75x82 feet; from this the ore passes to the third level, where are placed the rolls, screens and elevators, and where it is finely crushed and screened, thence going to 25x84-foot ore bins, also of 2000 tons capacity. Under this latter ore bin is a dust chamber 11x100 feet, directly connected with the main flue and provided with eight hoppers.

From the second set of bins the sulphides and arsenical ore discharge into two Brown drying furnaces, reverberatory, hearths 12x60 feet, fired by gas, on the fourth and fifth levels. The silicious ore goes directly from the storage bins without roasting. The sixth level is reserved for additional surface space. On the seventh level is the "leaching department," 298x60 feet, ten solution tanks, each of 200 tons capacity, into which the ore from a tunnel the fifth and sixth levels is discharged. On the eighth level are the precipitation tanks, charged with zinc shavings.

South of the fourth level is a gas-producing plant 30x68 feet. The gas is used for roasting and drying, and, it is claimed, effects a saving of 25% in the fuel bill. Eleven dynamos of a combined capacity of 600 H. P. furnish power. An outline sketch of the mill and of the ground plan furnishes a fair idea of the general appearance.



GROUND PLAN OF GOLDEN GATE MILL, MERCUR, UTAH.



THE GOLDEN GATE MILL, MERCUR, UTAH.

In the mine considerable development work has been done during the last three years, and the men say an enormous amount of $5 ore is blocked out. In mining the cave-in system was adopted—a drift run under the ore body along the footwall, timbered just enough for safety, the ore then divided into blocks, every other block being left standing as a support to the hanging wall, the remaining blocks mined out and the pillars then broken down. To do this a second drift is run along the hanging wall, the ore pillars loosened, gravitating toward the outlet.

Worthy of Commemoration.

On the 1st of next August it will be just twenty-five years since the first cable passenger railway car in the world began operation in San Francisco. It has been suggested that a record of the creation of this great invention be made by erecting a cast steel pillar on the S. E. corner Clay and Kearny Sts., where the terminus of the old Clay street road used to be.

Among those who have made the world better and more advanced for having lived in it is the inventor of the cable railway system—Mr. A. S. Hallidie—and it would be a fitting testimonial to his worth, and appropriate commemoration of a great industrial advance, to erect some such pillar or enduring memorial as suggested. The MINING AND SCIENTIFIC PRESS believes that it would be particularly appropriate for the Mechanics' Institute of San Francisco to take this matter in charge. At a meeting of the Institute, March 3rd, 1891, the following was unanimously adopted:

Your committee appointed to report on the invention of the cable railway beg leave to present the following:

The first street cable railway had its development in San Francisco, State of California, through the skill, ability and energy of one of her citizens, Mr. Andrew S. Hallidie, who completed the construction and had the first road in operation on Clay street in this city on the first day of August, 1873. At the request of the Board of Trustees, Mr. Hallidie placed before the public at the Twenty-fifth Industrial Exposition of the Mechanics' Institute, 1890, the original models and appliances used by him, and also filed a history of the enterprise, which has been embodied in the published report of the exhibition.

The invention and construction of said cable railway has revolutionized the methods of transporting passengers in cities and towns to the great advantage and benefit of the traveling public and the material advancement and prosperity of the towns themselves. Its value has been recognized and utilized in nearly all parts of the world.

The Mechanics' Institute of San Francisco, through its Board of Trustees, does hereby testify to the value and importance of the invention of the street cable railway, and recognizes the genius and worth of Mr. Hallidie, whose patience, perseverance and energy enabled him to overcome the difficulties and discouragements encountered in its construction and introduction; therefore

Resolved, That the Mechanics' Institute hereby records its recognition of the introduction of the cable railway by Mr. Andrew S. Hallidie of San Francisco, State of California, and expresses its appreciation of the great value of said invention.

Resolved, That the foregoing be spread upon the records of the Institute, and that an engrossed copy thereof, signed by its president and recording secretary and sealed with its seal, be forwarded to Mr. Andrew S. Hallidie.

DAVID KERR,
President.
C. F. BASSETT,
Recording Secretary.
A. W. SCOTT,
W. R. ECKART,
J. K. FIRTH,
Committee.

Nothing need be added to the above testimonial. The actual value of Mr. Hallidie's invention to the real estate of this peninsula is enormous. Apart from the improvement, convenience and general advantage of the system of cable railways, the increase in property values consequent th[illegible] est factors in San Francisco's p[illegible] every one whose property has been made more valuable, or whose life has been made easier, by Mr. Hallidie's invention to contribute a cent to the proposed memorial, the aggregate would reach into the thousands of dollars. The idea is commended to the Mechanics' Institute for action thereon. While the air is resounding with acclaim for the heroes of the present war, it is no less in order to appropriately remember and commemorate an equally great achievement in the arts of peace and progress.

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J. F. HALLORAN.....Publisher

San Francisco, June 18, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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THE MINING AND SCIENTIFIC PRESS is always glad to receive and publish communications of interest in mining and metallurgy. Interchange of opinion and experience is of general value to the mining industry, and mining men everywhere are invited to consider these columns an open forum for discussion and information upon cognate topics.

IN the issue of the 28th ult. it was shown that the mineral yield of California for '97 was $25,142,441, and of Colorado for the same period was $35,964,034. The fact should not be overlooked that the gold, silver, copper and lead yield of Montana for that calendar year aggregated in value $42,308,373, figuring silver at the price of 60 cents per ounce.

AT its recent Salt Lake meeting the Western Federation of Miners declared in committee against the proposition to create a cabinet position of Secretary of Mines and Mining. As the sessions were secret, the reasons or arguments for such action are unknown. It would be interesting to note what their tenor were. If there is any one class more than another that would be benefited by the creation of such a department it is the men who compose the federation. That such a department is a national necessity is a fact patent to many who have given the matter mature consideration.

AS HITHERTO noted, according to the new ruling of the Secretary of the Interior, all applications for U. S. patents for mining claims must be accompanied by an affidavit that $500 worth of work has been expended for each claim. In case of a group of contiguous claims, if it can be shown that the work done on any one of them went to improve or develop the entire group, such will be admissible, provided the affidavit shows that on such one claim the work or improvement aggregates as many times $500 as there are claims in the group for which patent is desired. For instance, if the application be for say five claims, an aggregate of $2500 in work or improvements must be shown to have been expended: such $2500 can have been put entirely upon any one of the five, provided it be shown that such amount tended to improve or develop the whole five. This ruling went into effect last December, but at the earnest solicitation of many mining men was suspended until July 1, 1898. After the 1st of next month there will be no further extension of time, and it is important that this matter be given general heed.

Quicksilver Production.

California is the sole producer of quicksilver in commercial quantities in this country. It is one of the very few American metal products whose price is governed by European production, with the additional anomaly that there is no direct domestic competition, as the product of the Spanish quicksilver mines is sold in Europe and the East, scarcely any Spanish quicksilver being imported to the United States. In the past few months the price has materially advanced, due less to the Spanish war than to the peculiar circumstances of their control. The war makes no increased demand, the tendency, if in any direction, being the other way, yet the price has steadily risen. Following that, of course, manufacturers of quicksilver products have also advanced prices, vermilion, for instance, having appreciated 8 cents per pound this month.

The San Francisco receipts of quicksilver for the first five months of '96 were 15,339 flasks; for the corresponding period of '97, 5960 flasks; '98, 9472 flasks. From San Francisco, during the same period this year, were exported 3261 flasks, of which 2553 went to Mexico, 606 to Central America, 82 to British Columbia, 20 to New Zealand: the value of these shipments was $116,918. There were also Eastern shipments overland, aggregating about 2700 flasks.

In view of the present price and the probability of its continuance, attention is being directed to other possible sources of supply. The Savonas, B. C., cinnabar property has already been described. Southern Oregon correspondents of this paper assert that "immense masses" of cinnabar exist in Douglas Co., and that if treated on a very large scale they could be made valuable. Inquiry elicits the statement that the yield of mercury is less than one-fourth of one per cent, which precludes all possibility of furnace treatment with profit. Where power could be made cheaply available, in connection with concentration, it might be possible to profitably treat very low grade ore; could concentration of ore carrying, say, five pounds of mercury to the ton, be carried to the extent of 10 to 1, a small furnace and reduction plant, economically operated, might be of resultant profit. It is to be said, however, that, so far as we are informed, all efforts to concentrate cinnabar ores have so far been unsatisfactory. This paper would be pleased to receive some authentic data of experiments in this State in crushing and concentrating these ores. It would seem to be largely a question of method, and if in this regard stamp-mill crushing or ordinary sizing and jigging methods were failures in treating this class of ores, other appliances might insure a more satisfactory result.

In intimate connection with the alleged existence of large quantities of low grade cinnabar ores in Oregon and elsewhere, the fact must be bore in mind that, even with comparatively high grade ore and the most modern and economical appliances, the producers of California quicksilver do not find the business extraordinarily lucrative, because of the manipulation of the Spanish mines by their foreign owners.

IN Griqualand, Cape Colony, Africa, are reported discovered large deposits of asbestos, of 25% less specific gravity than the Canadian or Italian product. An English company, composed of owners of the De Beers diamond mines, is organized to mine and market it. Increasing demand for asbestos makes necessary new supplies, though the cost of transportation from the far-off source of the new supply makes profit doubtful. Frequently specimens of serpentine fiber are received at this office from all parts of the coast but so far as observed the deposit is in no instance large enough to be of commercial value.

THE Sonora folio of the Geologic Atlas of the U. S. is this week received from H. W. Turner, U. S. Geological Survey, being the ninth of the California series and of equal importance. The information and the maps printed in colors make this series of value to miners everywhere. The folios may be procured from the U. S. Geological Survey at Washington, D. C., by sending 25 cents for any one of them. This work has received considerable deserved favorable editorial mention herein, and the latest folio is of the same creditable character.

A Huge Enterprise.

What is probably the greatest hydraulic enterprise in the world's history is in progress in Western Australia. The Coolgardie Government has undertaken a tremendous task, to supply the gold mining country of that section with 5,000,000 gallons of water daily. A portion of the enterprise involves the building of a pipe line 328 miles in length; 264 miles of this is to be of riveted steel pipe, about 31 inches internal diameter; 82 miles is to be welded steel pipe, from 26 to 29 inches internal diameter. This matter was given extended technical notice in detail on page 282 of the issue of March 12th, '98, and in this connection is worthy of reference. The engineers composing the committee, in their recommendation, discard cast iron pipe, discussed pipe made of steel spiral embedded in concrete, and as appears by the advertisements have decided upon steel pipe exclusively, which though not so specified, is apparently intended to be laid on the surface of the ground, which, if so, is somewhat surprising. Apart from any consideration of corrosion of the pipe, owing to the alkaline character of the soil, the great difference in the temperature of that country must necessarily occasion great strain. It is calculated that a change of temperature of 50 degrees F., would cause a strain in material between the rivet holes in circumferential seams of riveted pipe equal to about 16,000 pounds per square inch. The fact that the temperature in Coolgardie at times reaches 130 degrees F., indicates this to be a serious factor in the problem. At the time the matter was first broached it was suggested herein that California redwood could well be used. Californian and American engineers generally have had considerable experience in this regard, some extensive pipe lines having been built in portions of this west half of America, where the conditions, climatic and otherwise, strongly resemble the country under discussion. The proposed contract is a very extensive one. The 328 miles of pipe called for in the advertisement will weigh in the neighborhood of 85,000 tons, to be delivered in Western Australia. This alone involves an expenditure of about $4,000,000. It will be noticed that the "Government does not bind itself to accept the lowest or any tender." From an American standpoint there are some curious conditions attached. Anyone desirous to bid will have to pay "two guineas" for form of tender. The bids must be in the office of the London agent, 15 Victoria, Westminister, S. W., or in the hands of the director of public works, Perth, Western Australia, by noon of August 23rd, 1898. The office of the American agents, Messrs. Seward, Guthrie and Steel, is at 40 Wall street, New York, whom any American contractor desirous of considering the work would do well to address. From the form of the advertisement it would appear that this entire matter is somewhat preliminary, and based upon a desire for information on the part of the projectors. The report of the committee would indicate that further information received by the Western Australian Government would be a matter of considerable economy to them.

A CURRENT item in a Denver, Colo., daily furnishes emphatic comment upon different forms of mine management. It seems that the owners of the Lucky Guss mine, after paying $140,000 for the property, worked it for two years at a loss, and four months ago owed seventeen working miners $5200. The mine was turned over to them to get out, if they could, enough to pay what was due them. The miners knew what could be done under practical, competent management, took the property, paid all mining expenses, and so managed that the royalties on the ore shipped during the time they had charge amount to something more than the sum the company owed them when they took hold. Having been shown how to make their property pay, the owners now propose to resume control of their property and work it themselves. The seventeen miners want to lease the property, and, unless the company has a good manager in view, it would seem more profitable to them to continue the present arrangement. Of course, in the absence of detailed facts, it is possible that were all the circumstances given, the onus of failure should be placed somewhere else than on the shoulders of the former manager, but the incident as

published strikingly illustrates the difference between success and failure resulting from two different methods of mine management.

A Mineral Land Decision.

In the issue of Jan. 22nd, '98, was an editorial paragraph on a decision in a case in the Circuit Court for the northern district of California. The Government had brought suit against the Central Pacific Railroad and sundry Butte county residents to secure a reversion of a section of mineral land in that county. In 1866 the public land commissioner granted the land to the railroad company as agricultural land. The company subsequently sold it to the Butte county men, who were made general defendants in the suit, and who developed large mining interests thereon. The Government, through its lawyers, asked that the patent be cancelled by reason of error on the part of the land commissioner, as the land was evidently mineral and not subject to the terms of the original grant. It was further held that the defendants were acquainted with this fact and that they also owned mines in the immediate vicinity of the lands under dispute. The counsel for the Government maintained that this error of the land commissioner could be corrected and that the original patent to the railroad company could be cancelled, which was the view held by Judge Morrow in deciding the case. Following is the syllabus and decision in full, as furnished by A. H. Ricketts, chairman of the Mineral Land Committee of the California State Miners' Association:

UNITED STATES v. CENTRAL PAC. R. CO. et al.

1. PUBLIC LANDS—MINERAL GRANTS.

A patent granted under Act July 25, 1866 (14 Stat. 239), which excepted mineral lands, is invalid, if at the time of the issue of the patent the land was known to be chiefly valuable for mineral.

2. SAME—CANCELLATION OF PATENT.

Under Act March 3, 1887 (24 Stat. 556), authorizing suits to cancel patents to lands erroneously certified or patented, and to restore the title thereof to the United States, a patent conveying mineral lands knowingly purchased as agricultural lands will be cancelled as having been erroneously made.

3. BONA FIDE PURCHASERS—NOTICE—GOOD FAITH.

Purchasers of land erroneously patented as agricultural land are not bona fide purchasers without notice, when they knew at the time they purchased the same that it was mineral land; and purchasers who located and worked mineral claims thereon prior to acquiring any interest therein are not purchasers in good faith.

This was a bill by the United States against the Central Pacific Railroad Company, James O. B. Gunn, William E. Brown, W. M. Bowers, John Gale, A. F. Jones, Henry A. Basford and Milton E. Joyce, to cancel a patent issued to the Central Pacific Railroad Company under a land grant.

W. H. H. Miller, U. S. Atty. Gen. (H. S. Foote, U. S. Atty., and Samuel Knight of counsel), for the United States.

Mastick, Belcher & Mastick for defendants.

MORROW, Circuit Judge. This is a bill in equity brought by the United States to cancel and set aside a patent to public lands issued to the Central Pacific Railroad Company, successor to the California & Oregon Railroad Company, under the act of July 25, 1866 (14 Stat. 239). The bill, as amended, alleges that the patent was made to include section 27 in township 24 N., range 3 E., Mt. Diablo base and meridian, through mistake and inadvertence on the part of the officers of the Land Department. This section of land is situate in Butte county, State and northern district of California; and it is alleged in the bill, as amended, that for a long number of years before the selection of said section 27, and prior to the issuance and delivery of said patent, said section was, and it since has been, and it is now, well-known mineral land, and that it was at all of said times, and it is now, valuable chiefly for its mineral, and that during all of said times it was, and it is now, not valuable for agricultural or timber purposes, and that during all of said times it was, and it has been, and it is now, worked successfully as mining ground, and that at all of said times there were, and there are now, in successful operation, a number of mines on said land. The defendants answered the bill as amended. The United States introduced testimony in support of the allegations as to the mineral character of the land. No evidence was presented on behalf of the defendants, beyond their sworn answers.

That a bill in equity will lie to correct material mistakes of the Land Department in granting patents to public lands is beyond question. McLaughlin v. U. S., 107 U. S. 526, 2 Sup. Ct. 802; U. S. v. Minor, 114 U. S. 233, 5 Sup. Ct. 836; Mullan v. U. S., 118 U. S. 271, 6 Sup. Ct. 1041; Williams v. U. S., 138 U. S. 514, 11 Sup. Ct. 457. Mineral lands were excepted from the grant made by the United States to the railroad company. See Act July 25, 1866, §§ 2, 4, 10 (14 Stat. 239). The question to be determined by the court is whether the land involved in this controversy was or was not "known mineral land" prior to the issuance and delivery of the patent therefor. The map of definite location of the California & Oregon Railroad opposite the land in question was filed November 25, 1867, and the land was thereupon withdrawn from sale. The patent was issued March 17, 1875. The testimony shows that section 27 contains mineral lands; that the land is unfit for agricultural purposes, but is valuable chiefly for its mineral; that it was "known mineral land" at and prior to the issuance of the patent; that it was occupied by miners at very early days. Some of the witnesses state that they went on the section as early as 1850 and 1851, and that they mined there at, or shortly after, that time; that mining was carried on subsequent thereto; and that it has been remunerative. It would be useless to review the testimony in detail. It is sufficient to say that it shows clearly and satisfactorily that section 27 contains, and contained "known mineral land" when it was withdrawn from sale, and when the patent was issued. The evidence certainly satisfies the test of what are mineral lands, according to such cases as Deffeback v. Hawke, 115 U. S. 392, 404, 6 Sup. Ct. 95; Davis' Adm'r v. Weibbold, 139 U. S. 507, 519, 11 Sup. Ct. 628; Iron Silver Min. Co. v. Mike & Starr Gold & Silver Min. Co. 143 U. S. 394, 12 Sup. Ct. 543. See, also, for definition clearly stating what constitutes mineral lands, the language of Judge Knowles in Railroad Co. v. Barden, 46 Fed. 610; Id., 154 U. S. 288, 14 Sup. Ct. 1030. The general criterion would seem to be that the land must be more valuable for mineral explorations than for agricultural purposes. There must be sufficient evidence of mineral to justify the expenditure of time and money for its extraction. And it must be so known at the time of the issuance of the patent therefor. Deffeback v. Hawke, supra; Davis' Adm'r v. Weibbold, supra; Whitney v. Taylor, 158 U. S. 85, 15 Sup. Ct. 796; Barden v. Railroad Co., supra. All these conditions appear to be amply satisfied by the evidence presented. It follows that the patent to the railroad company, in so far as it includes section 27, was issued through mistake and inadvertence on the part of the officers of the Land Department, and that it is void for want of authority to issue the same. Section 2318 of the Revised Statutes of the United States provides "that in all cases lands valuable for minerals shall be reserved from sale, except as otherwise expressly directed by law." It being established that the lands in section 27 were valuable chiefly for mineral at the time of the issuance of the patent, the title of the grantee company could not be held valid, because acquired contrary to law. Stoddard v. Chambers, 2 How. 284. If the lands are valuable for mineral, and were knowingly purchased as agricultural lands, the patent issued by the Government would convey no title, because issued unadvisedly, or by mistake of an officer of the Government while acting ministerially. U. S. v. Stone, 2 Wall. 525. The mistake and inadvertence on the part of the officers of the Land Department are easily explained. The application by the railroad company for the land under the Act of July 25, 1866 (14 Stat. 239), was entirely ex parte. The railroad company applied for the land, as being within its grant, and the officers of the Land Department considered that the land was subject to the application. But this cannot prejudice the rights of the United States, if the lands were in fact mineral, and were known to be such when the patent was issued. There was no protest or contest of any kind which was likely to bring to the notice of the officers of the Government the fact of the mineral character of the land. The patent having been made to include, erroneously, this section of land, to the railroad company, the United States has a paramount right to have the error or mistake corrected. The Act of March 3, 1887 (24 Stat. 556), authorizes suits to cancel patents, or other evidences of title to lands "erroneously certified or patented," and "to restore the title thereof to the United States." This disposes of the case, so far as the grantee company and its trustees are concerned.

With respect to the other defendants, it is further urged that they are bona fide purchasers. It appears from the allegations of the amended bill that these defendants hold contracts with the grantee company and its trustees to purchase from the latter the legal title to certain parts of section 27. The status of a bona fide purchaser is made up of three essential elements: (1) A valuable consideration; (2) absence of notice; and (3) the presence of good faith. 2 Pom. Eq. Jur. § 745; U. S. v. Winona & St. P. R. Co., 15 C. C. A. 96, 67 Fed. 948, 962. I am of the opinion that these defendants had notice, actual or constructive, of the character of the land in section 27 which they contracted to buy from the grantee company and its trustees. They were certainly chargeable with notice of the character of the land, for it had been occupied and known since 1850 as mineral land, and as being unfit for agricultural purposes. It was covered with evidences of mining claims and mining explorations. Notices of location affecting different portions of the section had been filed of record in the mining recorder's office of the Forks of the Butte mining district before the defendants entered into their contract to buy the land from the grantee company and its trustees, which was some time in 1885 and 1886. With respect to the defendants Jones and Gale, it appears further that the element of good faith is entirely wanting, for Jones had, before acquiring any interest in the land he contracted to purchase, owned and worked a claim in the same part of this section, while Gale had, with others, filed a mining location upon the same land which he contracted to buy.

Without entering into a further discussion of the points involved in this case, I am of the opinion, from the evidence, (1) that section 27, township 24 N., range 3 E., Mt. Diablo base and meridian, State of California, contains lands which are valuable chiefly for mineral explorations, and not for agricultural purposes; that this fact was known at and prior to the time when the patent was issued to the grantee company; (2) that the patent, in so far as section 27 is concerned, was issued through mistake and inadvertence on the part of the officers of the Land Department, and that it is void for want of authority in said officers to issue the same; (3) that the defendants, other than the grantee company and its trustees, are not bona fide purchasers. A decree will therefore be entered in favor of the complainant—the United States—declaring the patent void with respect to section 27, and directing a cancellation of the same; and it is so ordered.

THE Risdon Iron Works of San Francisco is pioneering a new manner of placer mining in Colorado—dredging the streams. At Breckenridge in Summit county, where the depth to bedrock is 40 feet, and the fall is too slight to make ordinary placer work profitable, two dredgers have recently been put in, and local reports are favorable. In New Zealand costly experiments have reduced river gold dredging to almost an exact science: in California great progress has been made in that direction in the past few years: in Montana the method has met with marked success, and, now for the first time in its history, the great commonwealth that has laid down the garb of the silver miner to win pre-eminence in the product of gold, essays a new form of placer gold mining. The Blue River valley is a good field for such initial operations.

THE hitch in the sale of the Le Roi, B. C., mine, the biggest mining transaction of the year, seems to be a purely technical one occasioned by the mining laws of the Province. In '97 the British Columbia Legislature repealed the former law on the subject and enacted one which does not include registered foreign corporations. It was assumed that a two-thirds vote of the stock could convey the property, but it is now claimed by British Columbia authorities that while control could thus be secured, full title to the property can only be had by buying every share of the stock. The question is simply this: Can a foreign corporation sell by vote of a majority of the stock? This right is conceded to corporations where there is no contrary provision and such general right will, doubtless, ultimately prevail in this case.

OBJECTORS to mining investments sometimes plead the "transitory character" of a mine. The objection is not well taken, for, if extended, would apply to every form of business. Indeed, few forms of investment are more permanent. How often one notes the going to pieces of some old-established mercantile business or the sudden cessation of what seemed a profitable enterprise in every line of business! Yet that is not used as an argument against embarking in trade or engaging in any line of business. In this regard the mining business will not suffer by comparison. It has of late years become similar to any other form of legitimate enterprise—has its successes and failures—just as has any other line of human effort.

OUR agents traveling through the mining regions write that everywhere they find the prospector. This is the season when in many places the prospector is most active. Usually he prefers a lively mining camp, as a claim can be disposed of in that vicinity quicker than in a quieter or less talked-of locality. Next in point of attractiveness is a section where long paying mines are in operation, and have thus made the surroundings of good repute. The investor who prefers to pay a small price for a good prospect, out of which a dividend-paying mine can be made, in preference to paying a big price for an already producing mine, usually makes, in the long run, a more profitable investment.

Stamps vs. Rollers, Etc.

In the current number of Mines and Minerals, a prize of $1, offered for the best answer to the following question, was awarded to H. Vernon of Oakland, Cal.:

Say whether you would prefer a roller quartz mill or a battery of stamps for crushing gold-bearing quartz, and explain its relative merits and the special conditions under which you would prefer one or the other:

The relative merits of roller and stamp mills are dependent upon the conditions under which the mills are to work. The advantages of roller mills are the following: The cheapness and ease with which the mill is transported and erected as compared with stamps; they are better adapted for crushing clayey, oxidized or soft ores that require a moderate degree of crushing in order to liberate the gold; also for ores in which the gold is coated with a film of oxide (commonly called rusty); the roller mill is very efficient in scouring the gold so as to present a bright surface for amalgamation; the roller mill is also to be preferred to a stamp mill for recrushing middlings or jig tailings, or where the output is small, or the crushing is intermittent. Roller mills save a good percentage of the gold, under favorable conditions saving as high as 80 per cent within the mortar, which is higher than is generally recovered on the inside plates in a stamp mill. The roller mill is very useful as an auxiliary crusher to the stamp mill for crushing the fine material that may occur with the ore, and thus permit the stamp mill to be regulated for crushing an ore of uniform size and hardness. However, this is not always advisable, as the quantity and value of the fine stuff, the probability of the character of the ore changing, etc., are factors to be considered. Greater efficiency, though, is secured in adapting a mill to the ore, rather than the reverse.

The disadvantages of roller mills as compared with stamp mills are as follows: They are not economical when crushing hard quartz ores owing to the excessive wear of the rollers, which have a tendency to wear unevenly on the surface, necessitating frequent changes, thus diminishing the capacity; the frequent stoppage of the mill for inspection and cleanup, and its unsuitableness to ores of a varying nature.

The advantages of stamp mills over roller mills are as follows: Increased capacity, freedom from stoppages and repairs; the wearing parts being simple castings are readily duplicated in any ordinary foundry; especially adapted to hard quartz ores and those of variable character without changing the construction of the mill; they also possess the advantage of stopping one or more stamps at will without interrupting the others. In short, the stamp mill is to be preferred for crushing gold-bearing quartz because it has proven itself a reliable and economical crusher under various conditions; it is easily started and stopped; is an efficient amalgamator, and is the mill most generally used and adopted for extracting the gold from most free-milling ores.

The disadvantages are the firm and substantial foundation required; the expense in transporting the mill through rough country and its unsuitableness for treating clayey ores that require a scouring action in order to release the gold.

W. J. Weatherby of Cooney, N. M., answers another question thus:

If you had a sample of argentiferous ore given to you, what would you do with it to determine its value?

Although an argentiferous example is designated, we shall test for gold as well, since the latter may be present in any unfamiliar silver ore. The larger particles of ore are first examined with a lense to determine the probable value (whether exceedingly rich or not) and the general character, in order to select the best method of treatment. Let us suppose such examination showed it to be a medium grade ore of such character that we decide to find its value by fire assay, crucible method. The operation of crushing and parting the sample is carried on until only about six ounces remain, all of which must be passed through a 100-mesh screen. One assay ton of the pulp is carefully weighed out and transferred to a fireclay crucible containing the proper amounts of soda, litharge (lead oxide) and pulverized charcoal. The pulp and fluxes are well mixed, covered with borax, and the crucible placed in a heated assay furnace. What action takes place? The whole mass gradually becomes a bubbling, pasty fluid, and the innumerable particles of pulverized charcoal reduce a certain amount of litharge to the metallic state, so that thousands of minute lead globules go swimming and diving through the molten fluid, catching up and alloying with them all the precious metals contained therein. When the fusion is complete, the crucible is removed and the contents poured into a mold, the lead sinking below the lighter, liquid slag. After cooling, the glassy or stony slag and the lead are easily separated, and the latter is pounded into a cubical button weighing about one-third of an ounce. In order to effect the separation of the silver and gold from the lead, cupels are used. They are made from comminuted burnt bones, sometimes mixed with wood ashes, slightly moistened and molded into cylindrical-shaped masses, hollowed sufficiently at the top to hold the lead button when melted. The button is placed in the cupel within the muffle furnace, which is kept at a temperature sufficient to volatilize the lead but not the precious metals. The lead oxidizes and is partly absorbed by the cupel, the other part passing up the chimney. Fumes continue to rise and the melted metal grows smaller and smaller until the remaining little globule begins to spin like a top and then assumes all the colors of the rainbow. This indicates that the last traces of lead are being absorbed. Now the globule brightens and we carefully withdraw the cupel from the muffle, the operation being completed.

We note that the bright silver or lead button in this especial case is a little larger than a pin head, and, on being detached, brushed and placed on the button balances, weighs sixteen milligrams. This shows there are sixteen ounces of silver and gold to the ton of ore, because we took one assay ton of pulp, and an assay ton bears the same ratio to a ton of 2000 pounds that a milligram does to an ounce Troy. The button is now digested in nitric acid, which takes the silver into solution and leaves the gold in a spongy form. This is carefully washed, dried and ignited. Our delicate gold balance indicates that it weighs $\frac{3}{10}$ of a milligram, hence the ore carries $\frac{3}{10}$ of an ounce of gold per ton—the remainder, or $15\frac{7}{10}$ ounces being silver, from which we can readily estimate the value of the ore.

A third question, as below, was answered by Mr. Vernon as follows:

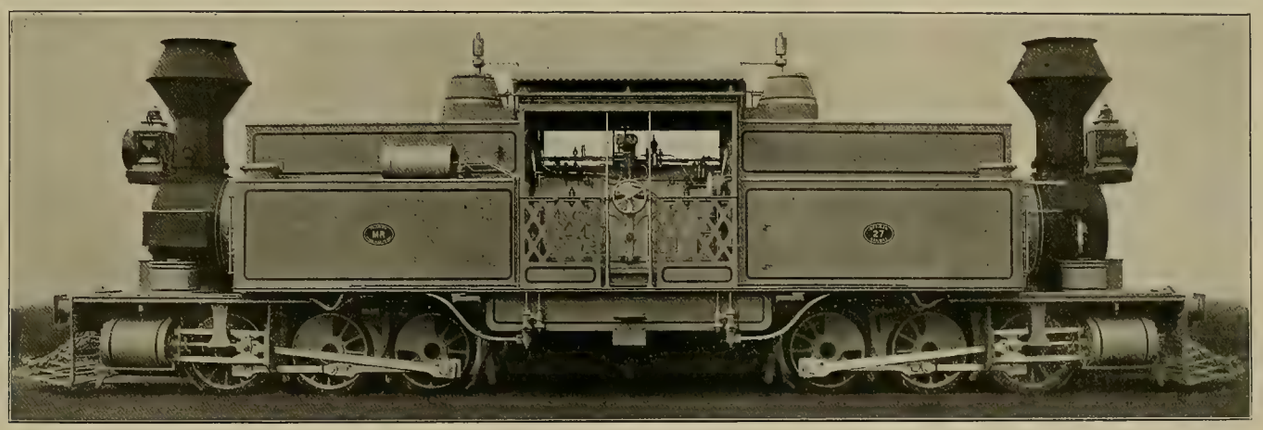
If you had set before you two pieces of ore consisting of iron and copper pyrites, how would you distinguish one from the other by simple inspection?

Copper pyrites differ from iron pyrites in the degree of color, being a deeper yellow, often tarnished in blue, purple and black hues, while iron pyrites have a pale to brassy yellow color with a brown hue when tarnished. Copper pyrites generally occur in a massive form; iron pyrites crystallize more frequently in the cubical system. The former is harder, being 3.5—4 in the scale of hardness, the latter 6—6.5. When the green and blue carbonates of copper occur in an ore with pyrite, the latter is more apt to be copper pyrites than the iron sulphide, as the carbonates have probably resulted from the decomposition of the sulphide of copper.

RECRUITING for Col. Griffin's brigade of volunteer engineers is going on all over the country. The brigade is limited to a total of 3500 men. The Washington *Star* says: "The engineer troops will be armed and drilled as infantry. They are line troops and must take their places in the line of battle when necessary. Their engineering duties will be the construction of and destruction of fortifications, field works, entrenchments, bridges, roads, railroads and tunnels, and will embrace field engineering work generally, besides map making and field reconnoissance work, photography, operation of stationary and locomotive engines, and electric apparatus, etc. Recruits, therefore, must be foremen, skilled mechanics of various sorts, handymen and first-class laborers, machinists, electricians, telegraph linemen, carpenters, timber framers, bracers, tunnel men, bridge men, iron men, erectors, riggers, blasters, quarrymen, lumbermen, boatmen and railroad men. Two cooks are also required for each company, also stationary and locomotive engineers and firemen. Allowances in addition to pay will be rations, bedding, all clothing, medicines and medical attendance. The volunteer troops will be disbanded and discharged as soon as the war is over, but no man should enlist, it is announced, unless he is prepared to serve for the full two years. Men should not be tempted to enlist by the hope that war will be over in a month or two, and that then they can return home."

The Mexican Railway's Double-Header.

Travelers over the Mexican railway from the City of Mexico to Vera Cruz are always greatly impressed with some of the engines they see in use on that line. The accompanying cut, for the use of which we are indebted to *Modern Mexico*, presents a view of one of these double-headers. The Mexican railway has twelve of them. Each weighs 100 tons, and is capable of hauling 190 tons up a 4½ per cent grade. They are of Scotch manufacture, built by the Fairlie Co. of Glasgow, and have been in the service of the Mexican road about ten years. These double-headers are used by no other road in North America. Not all of the engines used by the Mexican railway are of Scotch origin, however. They have a number of English manufacture, but a majority of their equipment of sixty-four engines were constructed in the United States.



A DOUBLE-HEADER USED ON THE MEXICAN RAILWAY.

Large Hoisting Works.

A steel gallows (said to be the largest in the world), now building at the War Eagle, B. C., mine, will cost $25,000 and will have a daily capacity of 1000 tons. From the ground to the axle of the head pulley is 100 feet; the shaft house building is 120 feet high, 180 feet long. The frame is constructed at the mouth of a new shaft being sunk from the summit of the hill at the rear end of the present main tunnel. It is through the new shaft, by means of the new hoisting works, that all the mine will be operated. It will be of sufficient capacity to reach the 3000-foot level. Among the devices for the economic handling of ore are three ore bins—one for waste, one for sorting ore, and one for the first-class product of the mine, their mouths located two-thirds of the way up the gallows, underneath the skip way. As the loaded skip reaches the mouth of the bins its contents will be dumped into the proper bin, and the skip itself is ready to return underground. The sorting ore, after being dumped, is passed by gravity over a fine grizzly, separating the smaller portions, which fall into the first-class bin, and are smelted with the high-grade product. Continuing on its way downwards, the sorting ore then passes through a grizzly with 6-inch spaces. The rock too large to pass the grizzly falls upon the sorting floor, where it is roughly hand-picked, and then passes through a Gates crusher, which reduces it to the standard size and forwards it to a self-feeder, where it meets the ore that passed through the second grizzly. From the self-feeder the ore, now of a uniform size, falls upon an endless belt that carries it past the sorters, which pick out the waste and per-

mit the ore to fall into the main receiving bin, where it is ready to be dumped into cars. Throughout the whole operation the ore will be practically handled and sorted automatically. The skips, two in number, with a capacity of three tons each, are being made by the Anaconda Co. at Butte, Montana. They will weigh two tons each and will be equipped both with a hood and a safety clutch, to prevent accidents in case the cable breaks. It is proposed to place skeleton cages beneath the skips for the use of the miners.

A Great Irrigation Enterprise.

The extension of irrigation facilities is of prime industrial importance. Both the individual undertakings by which water supply is developed, and the larger enterprises by which districts are supplied by good engineering and financiering, are a contribution to the producing capacity of the State and a means for its industrial advancement. Just how great enterprises should be planned and realized with justice to all interests involved is a question concerning which there are differences of opinion and upon which legislatures and courts still have much to do. Without attempting analysis of principles and methods involved in each undertaking, we can but express general satisfaction when water is made to flow out upon land which is by that means enhanced in valve and increased and ensured in production, independently of a fickle rainfall. From this point of view much interest pertains to a recent great irrigation event, viz., the completion of the Turlock irrigation enterprise in the San Joaquin, Cal., valley.

This enterprise is now eleven years from its inception and it has been carried to completion by surmounting difficulties of all kinds and was apparently rescued from failure by Ex-Judge James A. Waymire of San Francisco, who took up the abandoned contracts three years ago and has now brought the enterprise to a successful termination. The Turlock irrigation system is held to be among the most important in the United States, from the supply of water obtained, the quantity of land to be watered, its transportation facilities and the thoroughness with which the system has been worked out.

The Turlock irrigation district contains 176,210 acres, of which 139,510 are in Stanislaus and 36,700 are in Merced county. Soon after the passage of the Wright law, the people formed the Turlock irrigation district, on June 6th, '87. To carry out the work proposed $1,200,000 in 6 per cent bonds were issued. Of these $1,000,000 were sold at 90 cents, and have paid for the work done, the $200,000 remaining in the treasury to be expended in the completion of 120 miles of distributing canals.

The source of the water supply is the Tuolumne river, which is fed by the melting snows of the highest Sierras, and is therefore inexhaustible. Both the Modesto and the Turlock districts gather the volume of water pouring down from the mountains by means of the Tuolumne river dam, said to be the largest overflow dam in the United States. It measures 336 feet from bank to bank, is 129 feet high, 104 feet thick at the base and 20 feet at the crest. The overflow is 160,000 cubic feet a second, and the cost of the construction was nearly $500,000. From this immense dam at La Grange the water is led through a tunnel, 16 feet wide by 14 feet high and 600 feet long, to the main canal. For a distance of two miles this canal is cut in many places through the solid rock, and is 10 feet deep and 30 feet wide. In addition there are four flumes, which have been constructed during the last year. Flume No. 1 is a short distance below the great dam, is 200 feet long, and rests on a rocky foundation. Flume No. 2 spans Morgan's gulch for a distance of 560 feet on trestle work at a height of 60 feet. Flume No. 3 has similar support and height and crosses Dry creek at Delaney's ranch. Flume No. 4 traverses Peasley creek, also rests on trestles, is 40 feet in the air and about 400 feet in length. In all the main conduit system is twenty miles long, and its capacity is 1500 cubic feet, equal to 75,000 miners' inches of water, more than sufficient to irrigate 375,000 acres of land.

The cost, under the Wright irrigation law, is met by a land tax, which, in the Turlock district, will be at the rate of 40 cents an acre. At the same time it is estimated that the actual value of the land in this district will be increased from $4,500,000 to $9,000,000, the average value of water rights in California being placed at $53 an acre, and in the United States as a whole at $26 an acre. While the average cost an acre for an irrigation system is $8.15 in the United States, and in this State $23, the cost of the Turlock district system is said to have been only $6.81 an acre. The work has been a long, if a not very expensive, scheme, and that the enterprise has at last been carried out is a matter of satisfaction to those who have labored to secure it.

The engravings on this page are from recent photographs, and illustrate some of the chief constructive features of the enterprise; in the upper one the artist and the engraver have succeeded in producing the natural perspective in looking through the tunnel to daylight at the farther end.







SOME STRIKING FEATURES OF THE TURLOCK IRRIGATION SYSTEM JUST COMPLETED.

A RUSSIAN chemist has suggested the following methods for making wood water-tight: Coat the wood with a mixture of potassium bichromate and gelatine, and expose in the light. 2. Immerse the article in a warm solution of paraffine, to which some solution of gutta percha in benzole has been added. 3. Paint with a mixture of caseine, quicklime and albumen, well mixed. After coating with any one of these substances the film should be rubbed down with pumice, then painted with good oil paint, rubbed again with pumice and then varnished.

WHAT is believed to be the tallest flag pole in San Francisco now carries a 40-foot silk flag that waves over the MINING AND SCIENTIFIC PRESS office. It is 70 feet in length, and is stout as the mainmast of a ship.

Some Metallurgical Methods at Broken Hill, Australia.*

NUMBER V.

Amalgamation was discontinued one year ago. The extraction of silver was satisfactory, but the specific gravity of the ore was high enough to always interfere with the separation of the mercury in the settling pans, and one would see masses of manganic iron slime that were full of mercury in the finest state of division, of course carrying silver, with which nothing could be done economically to extract the locked-up mercury. It soon resolved itself into a matter of the cost of mercury, but if an ore of about twenty to twenty-two ounces of silver had been obtained steadily for the amalgamation work, there was no doubt of its superiority to the leaching plant, because the loss remained the same whether on fourteen-ounce or on twenty-ounce ore, a rule which did not act so well with the leaching. As the grade of ore necessarily low in lead could not be obtained in large enough quantities to keep the whole of the plant going, it was stopped. Its capacity was about 1000 tons weekly. There were sixty stamps erected with a drop of 6 inches, weighing 850 pounds each, and ninety-five drops a minute. The remainder of the plant consisted of four grinding and twenty-four Howell amalgamating pans, each 4 feet 6 inches in diameter and 3 feet 4 inches deep, the first-named pans running forty revolutions a minute, and the latter seventy-five to eighty revolutions. There were also twelve settling pans running fourteen revolutions a minute, each being 8 feet in diameter and 3 feet 6 inches deep, the whole of the pans being cast iron.

Towards the latter end of the operations it was found that sulphate of copper was not necessary for the successful extraction of the silver in the amalgamating pans, and it was not an uncommon thing to have the retorted bullion from this plant, after the use of the bluestone was stopped, running 996 to 999 fine in silver.

Concentration.—The first attempts at concentration were made on the low grade carbonate ores. The evil day of sulphide treatment had not yet come. The ore sent to the concentration department was highly silicious, low in lead and silver, and if the ore had been specially mined for the purpose of concentrating it, there is no necessity to hesitate over the fact that it was not a payable proposition. But, like the low-graded ores which are chloridized and leached, this ore had to be taken out, whatever use was made of it afterwards. The cost of mining it was borne by the smelting ore necessarily, and placing the matter on a common ordinary bookkeeping footing, this low grade stuff cost nothing delivered on the surface. Its value ran from 7 to 12 per cent lead and from six to fourteen ounces of silver, and the question was, Could this low grade material be concentrated at a profit? Without further treatment the ore was worthless, but the carbonate concentrate that was produced from the ore was infinitely preferable to use in the furnaces than the crude sulphide ores. Looked at in these days, when carbonate ore high in lead is getting to be worth more than the value of its metallic contents, there would be no hesitation as to what would be done with the low grade ore, but in those days, when lead ore in the carbonate form was plentiful, when the value of a ton of lead in Broken Hill was but 50 per cent of its London market price, the wisdom of some of the immense concentration plants which were erected seems doubtful. Block 14, the British Co., and the Proprietary rushed into enormous expenditure, whereas one only of the first concentration plants erected would have demonstrated forevermore their uselessness on the class of ore that had to be treated. The first system of concentration was with the Col-

* Condensed.

lom jig and after-treatment to recover the rich slimes by a kind of Linkenbach table. The ore was first crushed with an enormous steam-eating stamp, the very worst system of crushing which could have been devised for this class of ore. Think for a moment of the composition of the ore—a hard quartz and a friable carbonate of lead. Every blow of the stamp shattered the quartz into fragments—of that there could be no doubt—but it smashed the bulk of the carbonate of lead into slimes. The stamp was somewhat like the whole plant—there was no economy in the structure of either, and when finished neither did the work expected of them. Both the stamp and the jig were splendid appliances for dealing with ore like they have at Lake Superior, from whence they were imported, where the ores were copper, the latter existing almost—if not altogether—in the metallic form. No smashing blows could do any mischief on this class of material, and the large crushing capacity of the steam stamp was thus an advantage. Time went on, and the steam stamp was thrown out on the scrap heap, and a good many of the Collom jigs also. Alterations were made in their motions, notably at the British mine, where the tappet motion of the plunger was altered and driven with an eccentric, so giving a more even pulsation in the jig. This improvement was a good one, and if the size of the jigs had been about three times greater, considerably better recovery would have been made, for, after all, the Collom jig, as used in Broken Hill, was but a toy. As the carbonate ores began to disappear, the attention of the mine managers was impelled to the sulphide problem, of which volumes have been, and no doubt will yet be, written. The recovery of the first jigs did not amount to more than 48 to 54 per cent of the lead, but in spite of the low recovery the size of the jig allowed large quantities of ore to be rushed through them at the minimum of cost. As soon as it was found that some profit could be made out of the hitherto hopeless sulphide ore, even with such an extravagant loss of lead, more attention began to be paid to the retreatment of material rejected from the last hutches. These were crushed finer and passed through a second jig, and the same process was gone through with the low grade product of the hutches of this jig, passing it through a third jig, so that with the addition of slime buddles something like 65 per cent to 75 per cent of the lead contents of the ore treated is now recovered from the crude ore. The crushing machinery adopted for the ore with these jigs is the ordinary jaw-crusher on the old Cornish principle, with a set of Cornish rolls for finer pulverization.

It is stated that 75 per cent to 80 per cent of the lead contents of the crude ore is recovered by the Block 10 concentration plant, which is certainly the best work that is known yet. The plant is capable of treating over 2000 tons of crude ore weekly. The assays of the crude sulphide of lead, given earlier, are about the average value of most of the sulphide ores which are being concentrated, if we accept the South mine, which is higher in lead and lower in zinc and silver.

Costs vary with the different plants, and from 4s. 6d. to 7s. 6d. a ton on the crude ore are about the limits between which the costs at the different works lie. The recovery of the silver is the weak point in the concentrating process in Broken Hill, seldom more than 40 per cent of the silver contents being recovered in the lead concentrate. The reason is the zinc blende in the ore contains about an equal bulk of the silver, and the more successful the concentration to get rid of the zinc, the more successfully the silver is removed also. I think close investigation will show that this estimate of the distribution of the silver in the ore is a fairly accurate one, but it would be interesting to have more information on the subject. Hence in all the concentration plants at work in Broken Hill a difficultly marketable bye-product of zinc tailings is produced, running high in zinc and silver (up to 40 per cent zinc and twenty-five to thirty-five ounces silver per ton). The higher grades of this particular material are produced at Block 10, and they are content to accept as low as 10s. per ton for this production when a buyer is to be found.

(*To be Continued.*)

Cyanide Experience in Montana.

Matt W. Alderson, in the Helena, Mont., *Independent*, gives an account of his experience with the cyanide process in Deer Lodge and Madison counties:

From my earliest connection with cyanide work, I realized that the day of tailing piles would soon be past and the successful cyanide man would be he whose power of adaptation would be such as to enable him to fit leaching by cyanide to the regular crushing and concentrating part of a mill, thus making one handling of the ore all that would be necessary. The difficulty in the way of handling slimes having been overcome by agitation and subsequent settling and decantation of the gold-bearing fluid, a still greater difficulty presented itself in the enormous amount of cyanide necessary in direct crushing, it requiring ordinarily about seven tons of fluid to wash a ton of ore through the screens of a stamp mill. I have constantly had in view, therefore, more than anything else the past two years, the question of reducing the cost of cyanide per ton of material treated. How well I have succeeded will be shown in the following table:

Run of 287 tons at Iron Rod, Oct., 1896.

Run of 468 tons at Mohegan mill, Red Bluff, Sept. 24 to Nov. 8, 1897.

Run of 145 tons at Mohegan mill, Red Bluff, April, 1898.

	Iron Rod.	*Mohegan.*
Cyanide, per ton	$1 70	$1 0003
Other chemicals	06	0502
Zinc	0775	0817
Labor	1 88	1 0471
Assaying	10	1007
Incidentals	0745	075
Total cost per ton	$3 20	$2 355

A reduction at Mohegan mill of 84.5 cents per ton.

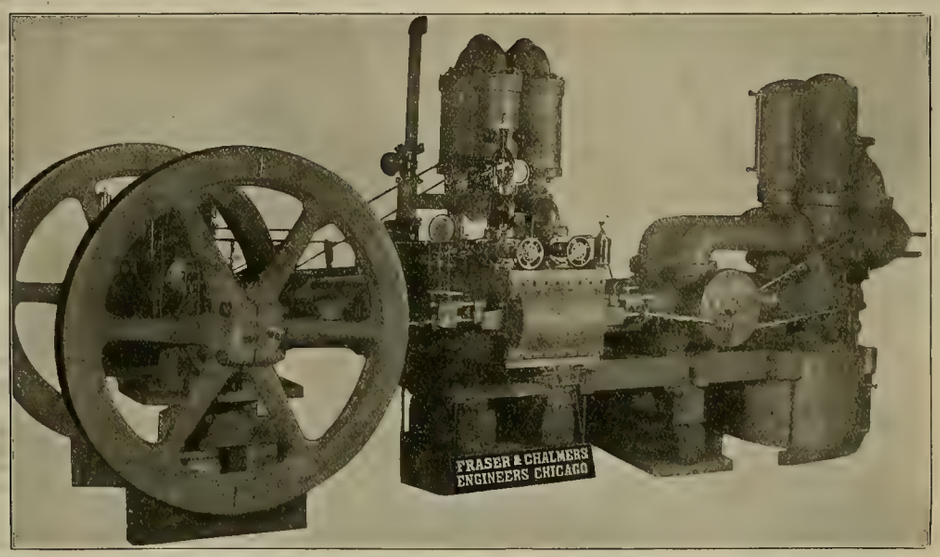
First 142 tons treated at Mohegan mill in fall of 1897 cost for cyanide, 510 pounds	$163 20
First 145 tons treated at Mohegan mill in 1898 cost for cyanide, 180 pounds	57 60
Saving in 1898 over 1897	$105 60
Cost per ton for cyanide, six weeks' run at Mohegan mill, 1897	$ 1 00
Cost per ton for cyanide, first 145 tons at Mohegan mill, 1898	40

Saving in one item of expense, in 18 months, 76 4 per cent.

In the face of these figures the apparent difficulties in the way of direct treatment were overcome, and the Mohegan mill commenced crushing ore. The ore from the Mohegan mill is dumped from wagons onto a grizzly, the coarse ore going to a Dodge crusher. From the bin below the ore passes automatically through a Challenge feeder to the battery. Here it is crushed in cyanide solution, passing through a 45-mesh No. 35 wire screen to the plates. Such coarse gold as the ore contains is thus recovered in the usual process of amalgamation. The pulp is conveyed from the foot of the plates by a launder to the agitator, where it is agitated for such a length of time as is deemed necessary. Experience has demonstrated that on the Red Bluff ore we can get all in solution, susceptible to the solvent action of cyanide, in from three to five hours. We therefore run the battery during the day time, fill one agitator—built to accommodate a day's run—and agitate and decant the necessary solutions during the night. The decanted fluids pass on through the extractor, where the gold is removed, and the fluid is again ready for the battery. The pulp in the agitator is discharged without handling, so from the time the ore enters the mill it travels its regular course without expense for labor. The process is thus continuous, economical, free from complications, susceptible to enlargement to any scale desired, requires no change in an existing plant, but becomes a valuable and comparatively inexpensive addition thereto.

Duplex Differential Riedler Pump.

Discussion of deep mining on the Comstock in the issues of Jan. 15 and Feb. 5, the matter of drainage, and the practicability of continuing at greater depth, lend interest to the recent placing of a Riedler pump in the Allison Ranch mine at Grass Valley, Cal., illustrated herewith. This pump was built by Fraser & Chalmers of Chicago for Mackay & Flood and installed last March. It is driven by a pneumatic cross compound engine; air reheated before entering high pressure, and again between high and low pressure cylinders; normal capacity, 700 gallons per minute against 500 feet head. All parts designed to stand a working pressure of 1200 feet vertical head. Its cost is about $5000. The pumping plant at the Union shaft on the Comstock had a capacity of about 800 gallons per minute, but it cost at the time approximately three-quarters of a million. Coupled with the comparatively small first cost of the Riedler, working tests also show a saving in operating expenses. The photo from which the accompanying cut was made was taken by flashlight in the mine, the background being removed to bring out the pump itself more distinctly.



DUPLEX DIFFERENTIAL RIEDLER PUMP.

Dumping Pan Conveyor.

Herewith is shown an illustration of the dumping pan conveyor manufactured under patents controlled by the Jeffrey Manufacturing Co. There has been for a long time a demand for a conveyor that possessed the advantages of carrying the load instead of scraping it along, that would at the same time discharge its load at any desired point along the line. This conveyor fulfills the requirements to an eminent degree, and, being carried by chains placed entirely outside and away from the gritty material, it can be depended upon for durability, as this feature also admits of running at a moderate speed. The capacity of this conveyor is unusual. The discharge is effected by allowing the truck wheels which support the pans to fall into depressions in the track at the desired points; when it is required to carry over these points, then a straight piece of track is swung into place.



DUMPING PAN CONVEYOR.

Further particulars may be had by addressing the Western branch of the above company at No. 844 Equitable Building, Denver, Colorado.

Coast Industrial Notes.

—Astoria, Or., millmen are paying $5.75 per M. for spruce logs.

—Port Angeles, Wash., and Victoria, B. C., are now connected by cable.

—Operations have begun on the Skaguay-Lake Bennett railway. Two hundred and fifty men are working at $3 a day.

—It is thought that $5,000,000 will be withdrawn from San Francisco savings banks for investment in United States war bonds.

—It is estimated that 80,000 sheep will be sheared in Kittitas valley, Wash., this year. The clip will average ten pounds to the animal.

—The Los Angeles, Cal., City Water Co. asks that city $3,000,000 for its water plant, including Crystal Springs; without Crystal Springs, $2,000,000.

—Of the Southern California line Gen. Mgr. Nevin has written that the business situation all through southern California has greatly improved during the last sixty days.

—The Stockton & Tuolumne Co., Cal., railroad is surveyed to Copperopolis. The steepest grade is 106 feet to the mile: the chief engineer figures the cost of the road to there at $8,927 per mile.

—The Oregon Improvement Co.'s coal business is at present earning the company $40,000 a month. The entire April net earnings of but $35,000 showed a material falling off from previous months, due to the sudden cessation of the Klondike rush.

—The Santa Fe Railroad Co. is now using oil on fifty-two locomotives. The average consumption per locomotive is about 500 barrels a month. There are on the two roads nearly 100 locomotives using oil. Thus the railway consumption in southern California alone is about 50,000 barrels a month.

—The Pacific Coast Borax Works, near Oakland, Cal., has made evaporative tests of southern California crude petroleum from the Summerland and Los Angeles districts. In the former a consumption of 2010 pounds developed 819 H. P.; in the latter a consumption of 1460 pounds developed 662 H. P.

—A contract has been let for the construction of a line of poles from Crafton to Los Angeles, Cal., for the Southern California Power Co., to carry electric power from the large power works in the Santa Ana canyon to Los Angeles. This will be the longest distance over which electric power of any considerable amount is carried in any part of the world. There are 125 men at work in the canyon completing the work. The long line of poles are to be up by Aug. 1.

—Mexican capitalists are said to have a concession to utilize for the generation of electric current fifty-six waterfalls, five of which are in the State of Chiapas, forty-five in Campeche, two in Tabasco, two in Oaxaca, one in Guerrero, one in Hidalgo and two in the State of Mexico. It is announced that the original concessionaires have sold their rights to a company in New York, and that the latter propose to establish 122 new industries at different points of the country, which will utilize electric power.

—Tacoma, Wash., reports that the Standard Oil Co. has decided to ship 250,000 gallons of kerosene up the Yukon river this summer. It is stated that the company intends to supply hereafter all the oil needed in the Klondike and other settlements on the Yukon river for lighting purposes, fuel, and for operating the frost extractors used in mining. The company has purchased a river steamer and a large barge, which are to be delivered at St. Michaels this month. In addition to these a 1000-ton schooner has been purchased, which will take on 20,000 cases of oil at Tacoma for St. Michaels. Oil sold as high as $30 a gallon at Dawson City last winter.

—The commercial importance of the Philippines as an American acquisition is emphasized by a series of tables issued by the National Bureau of Statistics. The victory at Manila was startling in its effectiveness and dazzling in its completeness from a purely naval standpoint, but is destined to be of more consequence than a mere stroke of naval strategy. The guns that destroyed the Spanish fleet in Manila bay thundered a warning to the nations of our approaching commercial supremacy in the Orient. The tables issued convey an idea of the commercial opportunities awaiting us in the countries adjacent to the Philippines, and the value of this field for Pacific coast traders and manufacturers is manifest. The significant fact disclosed by these trade reports is the increasing demand for the class of articles produced in the United States. Taking this territory adjacent to the Philippines—including China, British India and East Indies, Japan, Corea, Hongkong, Asiatic Russia and Oceanica—the exports of the United States are shown to have increased from $27,421,831 in 1893 to $61,927,678 in 1897. This commerce, however, is still less than 6 per cent of the total imports of these countries, showing the vast field which awaits producers and traders. The United States must have more than 6 per cent of the trade of those countries, whose doors are now open to the commerce of the world. With the Philippines as a base of supplies for our merchant vessels, it would be only a question of a few years when we would supply the Japanese and Chinese with the bulk of all their imports in clothing, breadstuffs, machinery, iron and steel products.

—Secretary of the Treasury Gage recommends the appropriaaion of $250,000 for the payment of wages of workmen and the contingent expenses at the mints in coining gold and subsidiary silver for the next fiscal year, together with an elaborate statement of the gold bullion now in the treasury and the needs for its conversion for prompt use. The appropriation is to enable the mints to convert a large part of the gold bullion now on hand, as well as to coin the current domestic deposits that will be made. The secretary calls attention to the $97,000,000 held in the treasury on June 1st and the apparent necessity for its conversion into coin at an early date to be applicable for disbursement from the treasury in case it should be required. Continuing, the secretary says: "Of the gold bullion in the treasury $92,000,000 is held at the assay office at New York and at the mint at Philadelphia, and to reduce the stock in a reasonable time it will be necessary to run overtime at the Philadelphia mint for several months. While the stock of gold bullion on hand at San Francisco at the present time is about $4,500,000, it will be increased in July and August by receipts from the Klondike, most of which will be deposited in that institution. Conservative estimates place the amount that will be received from the Klondike during July and August at not less than $12,000,000 to $15,000,000, and it will probably be necessary to work the mint at San Francisco overtime for two or three months. Especially will this be necessary should further importations of gold be made from Australia."

Personal.

G. H. ROBERTS, Director U. S. Mint, is in San Francisco.

G. MCAULEY is Supt. Mayflower mine, Forest Hill, Cal.

J. R. LIGHTFORD becomes Supt. Butte Bell mine, Nimshew, Cal.

W. F. DETERT, Supt. Argonaut mine, Jackson, Cal., has returned home.

F. CHAPPELET has resigned as Pres. Mayflower mine, Forest Hill, Cal.

F. ZEITLER, Supt. Champion mine, Nevada City, Cal., is in San Francisco.

R. V. HALTON, Supt. Ormonde mine, Washington, Cal., is in Oakland, Cal.

J. R. PHILIPS, Supt. Amador Queen No. 2, Jackson, Cal., is in Toledo, Ohio.

JOHN HAYS HAMMOND is expected in California from London next month.

LIEUT. GOV. A. E. SPRIGGS becomes Gen. Mgr. Ruby mine, Basin, Montana.

T. CLARK, Pres. El Dorado County Miners' Association, is in San Francisco.

G. STARR, Gen. Mgr. Empire mine, Grass Valley, Cal., is in San Francisco.

G. STARR, Gen. Mgr. Empire mine, Grass Valley, Cal., is in San Francisco.

M. W. MATHER, Supt. Plumbago mine, Alleghany, Cal., is in San Francisco.

W. MCKINLAY, Supt. Providence mine, Nevada City, Cal., is in San Francisco.

G. MAINHART, Supt. Omaha Con. M. Co., Grass Valley, Cal., is in San Francisco.

J. R. TREGLOAN, Supt. Keystone mine, Amador City, Cal., is in San Francisco.

W. C. RALSTON AND G. W. GRAYSON of San Francisco are at Winnemucca, Nevada.

H. E. PICKET, managing owner Grand Victory mine, Placerville, Cal., is in San Francisco.

W. I. SMART of New York is examining mining properties in Sierra and El Dorado counties.

H. VAN F. FURMAN is at Cairo, Egypt, and expects to return to the United States next January.

F. A. WING will be in charge of the new assay office at Seattle, Wash., at an annual salary of $2500.

CAPT. THOS. MEIN, consulting engineer of the London Exploration Co., has returned from Jackson, Cal.

J. F. WEBB, Mgr. and part owner Pocahontas mine, Placerville, Cal., is in San Francisco en route to St. Louis.

J. B. WHEELER, New York City, is visiting the Plumbago mine at Alleghany City, Cal., in which he is part owner.

H. PICHOIR, managing director in the London Exploration Co., has returned from a visit to the Oneida mine, Jackson, Cal.

CHAS. A. BUTTERS is in Denver from Johannesburg, South Africa, on his way to San Francisco via Salt Lake City, Utah.

J. EDWARDS, New York City, is in San Francisco en route to Mexico, whence he returns to California to examine properties in El Dorado county.

JOS. MCGILLIVRAY left yesterday on the Humboldt for Dawson. He takes up some boring and thawing machinery, on which he recently secured patents.

J. C. MCCOOK, the newly appointed Consul to Dawson, N. W. T., and N. H. Burke, Vice-Consul at the same place, are at Vancouver, B. C., on their way to Dawson.

MR. EDWARD L. BRAYTON of the Pelton Water Wheel Co., who has been at their New York works for some time past, has gone to England on business for his company.

Catalogues, Etc.

THE finest hanger received at this office this year is that of the Wm. Powell Co. of Cincinnati, O., showing their Star valve. Topographically, 'tis evident the valve is a world-wide institution; typographically, the card is unique and attractive. The Wm. Powell Co. will mail a copy anywhere upon request.

AN unusually fine catalogue and price list is issued by the Lunkenheimer Co., Cincinnati, O., of their makes of steam specialties, admirably arranged for reference and handsomely illustrated, and containing several useful tables. A copy will be mailed to any address upon application.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING JUNE 7, 1898.

605,079.—WINDMILL—J. Coats, Olive, Cal.
605,403.—DENTAL BRIDGEWORK—C. A. Davis, Pasadena, Cal.
605,279.—SAFETY LOCK FOR ELECTRIC LAMP—Faller & Herbstritt, S. F.
605,417.—BICYCLE STEERING HEAD—A. C. Garcia, Modesto, Cal.
605,460.—ROTARY ENGINE—M. E. Gilbert, S. F.
605,445.—WATER BATTERY—R. H. Gorter, S. F.
605,251.—TROLLEY HANGER—G. E. Johnson, Los Angeles, Cal.
605,200.—HYDROCARBON BURNER—C. R. Kittle, Los Angeles, Cal.
605,333.—IGNITER—O. Owens, S. F.
605,450.—NUT—R. R. Parrish, Independence, Ogn.
605,337.—LOCK—G. L. Petorin, S. F.
605,341.—TELEPHONE—Reid & McDonnell, Tacoma, Wash.
605,187.—PUMPING ENGINE—E. A. Rix, S. F.
605,345.—CALL-BOX SYSTEM—Salisbury & Dean, Tacoma, Wash.
605,238.—HOSE COUPLING—W. A. Sutlin, Marysville, Cal.
605,358.—SIGNAL—Taylor, Salisbury & Dean, Tacoma, Wash.
605,150.—FLUSHING TANK TRIP—E. E. Townsend, Capitola, Cal.
605,151.—BICYCLE SADDLE—J. F. Twist, S. F.
605,211.—TROLLEY SWITCH—J. H. Vanasselt, Seattle, Wash.
605,440.—PENCIL SPLICER—F. W. Warren, S. F.
605,366.—DOOR ALARM—G. D. Winters, Reno, Nev.
605,266.—STAMP MILL FEEDER—G. Wood, Prescott, A. T.
28,799.—DESIGN, SEAL PRESS CASE—A. H. Mackinon, Olympia, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SAFETY LOCKS FOR INCANDESCENT LAMPS.—Ernest Faller and Herrmann Herbstritt, San Francisco, Cal. No. 605,279. Dated June 7th, 1898. This invention relates to a locking device which is designed to prevent the surreptitious removal and stealing of incandescent-light globes. These globes are ordinarily screwed into permanent sockets with which the wires connect, where the proper contacts are made, so that by turning the key the electrical current will pass through the filament and produce the light, which may be closed by reversing the movement of the key. Much annoyance and difficulty have resulted from the ease with which these globes can be disengaged from the permanent socket, and they are very often stolen or removed, so that it is necessary to supply the loss with new ones. This device is intended to prevent this surreptitious removal. It consists in forming the metallic end which is fixed upon the globe and adapted to engage with the corresponding portion of the permanent fixture, with a catch which forms one of the engaging parts and a corresponding automatically engaging tongue projecting inwardly so that it is concealed within the exterior portion of the fixture. When the globe is secured into place, the catch and tongue engage with each other and prevent the globe from being again removed until it is disabled, when it can be removed by breaking the globe so that the catch can be reached and disengaged to allow the metallic threaded portion to be removed.

PENCIL SPLICERS.—Frank W. Warren, San Francisco, Cal. No. 605,440. Dated June 7th, 1898. This invention relates to a device which is especially designed to splice or connect two different pencils, so that either two pencils of different colors or qualities of hardness may be used or to enable the person to use up short ends of pencils. It consists of a short tube internally threaded, and with the threads so cut transversely as to form a sharp angle which makes the cutting-die so that the pencil can be screwed into the device and the thread will be cut upon it, which retains it in place. The ends of the holder may be made bell shape or diverging so that the pencil end can be easily introduced.

BICYCLE SADDLES.—Joseph F. Twist, San Francisco, Cal. Assignor of one-half to Lewis D. Radgesky of the same place. No. 605,151. Dated June 7th, 1898. The object of this invention is to provide a bicycle saddle having the front divided longitudinally, so as to form an open channel from the front approximately to the center of the saddle, the rear portion of which is closed, and to provide an adjustment for the saddle-front, by which the parts may be moved to or from each other to increase or diminish the space, and to adjust the saddle with reference to the rider's needs. It consists essentially of a segmental cantle, a leather covering, the rear portion of which coincides in shape with the cantle and is fixed thereto, the covering converging from the outer edges to the front end, and divided forwardly from a central point to the front to form independently adjustable pommels. These pommels have yokes connecting them transversely with slotted clamping bolts and nuts by which they may be clamped to the spring which extends beneath the saddle so that these front ends may be separated or moved beyond each other and locked in place. The saddle spring has a clamp which is adapted to be adjustably screwed to the top of the saddle posts, so that the saddle may be set at any desired angle and position with relation to the machine.

Harnessing the Sun.

When we sit in front of a coal fire, do we realize that the heat and light of the burning coal are really sunshine that has been stored up for ages? Centuries ago the sun shone on the earth, and plants and trees grew, fell, and grew again; they were covered by geologic deposits and acted upon by great heat and pressure, until in the course of ages these layers of organic matter were transformed into coal. The coal thus represents the work done by the sunshine ages ago, and when it is burned the imprisoned solar energy is loosened again. Our system of power production depends upon this presence of energy. But coal is a wasteful source of energy. Even the best engines do not utilize over 10 per cent of the calculated energy of the heat of coal. And besides this, it is an inconvenient thing in many ways; it has to be mined, freighted and stored. Can we not find some more economical way of using the sun's energy? During the last few years the great progress in electrical science has enabled man to utilize the solar heat in a thriftier way. During its day's work the sun draws up a large amount of water from the oceans and the damp earth. By the action of its rays plant life flourishes, and plants draw from the ground and evaporate into the air large amounts of water. Thus an oak tree of average size, with 700,000 leaves, lifts from the earth into the air about 123 tons of water during the five months it displays its foliage. This evaporated water, sooner or later, falls as rain and by the action of gravity begins to flow downward. Thus the great rivers are fed. Round and round incessantly goes the water lifted by the tireless sun, to fall when deserted by him, and again to be lifted, and again to fall and run seaward as long as it may exist upon this earth.

Recently Declared Mining Dividends.

Big Seven, Montana, $30,000; payable immediately.

Bullion-Beck, Utah, 10 cents per share, $10,000; June 15.

N. Y. Exploration Syndicate, $4.50 per share; June 15.

Wildman-Mahoney M. C., California, 10 cents per share; payable immediately.

Grand Central M. Co., Utah, 12½ cents per share, $31,250; June 15.

Homestake M. Co., South Dakota, regular monthly dividend, 25 cents per share; payable 25th.

Anchoria-Leland, Colo., $6000; June 11.

Elkton, Colo., 2 cents per share; payable immediately.

Portland, Colo., 1½ cents per share; $45,000; June 15.

Consolidated, Colo., 1½ cents per share; $120,000; payable July 1.

Parrott Silver and Copper Co., Montana, 3 per cent; payable July 1.

Commercial Paragraphs.

THE Union Iron Works of San Francisco has established a branch office at Bloomfield House, London Wall, E. C., London, Eng.

THE California Stump Puller Company of this city shipped five of its machines to the Hawaiian Islands last week on an order. This makes about a dozen in use on the Islands, which speaks well for the merits of the California Stump Puller.

THE Pelton Water Wheel Company has been awarded the contract for the hydraulic work of the new plant of the Central California Electric Power Co., to be installed at Auburn, Cal. This station is to embrace two 43-inch wheels, to run under 200 feet head at 300 revolutions, and develop 800 H. P. The wheels to be direct connected to a 500 K. W. Westinghouse Generator, which is to be electrically coupled to the generators running the Newcastle station of this company six miles distant, and the power transmitted to Sacramento over the same pole line, the entire distance from the Auburn station being thirty-four miles. The interesting features of this plant consist in running two stations so far apart in parallel; also in the double use of the water—it being the same as supplies the Newcastle station six miles lower down. With the rapid fall of our mountain streams power can thus be multiplied indefinitely from the same streams and generally within reasonable limit of transmission.

Recent California Mining Incorporations.

Demarest G. M. Co., Angels Camp; capital stock, $150,000; subscribed, $40,000; T. H. Fullen, D. C. Demarest, J. R. Darroh, G. E. Stickle, L. Monteverdi.

Pumping Water into a Tank.

So many inquiries have been sent to us, says the *Scientific Machinist*, asking for the best plan to adopt for piping water into a tank, that we herewith answer the questions in full, and hereafter correspondents will be referred to this issue.

In many places where a city water pressure is not available for filling tanks, water from a well or stream is used and put into a tank located at a greater or less height above the pump, so that more or less pressure is created by the fall as it is drawn off for use about the shop or factory. It requires much steam to raise water into these tanks, as it is usually done by direct-acting steam pumps that are not economical in the use of fuel. The question arises concerning the best way to arrange the piping so that the work may be done with the least expenditure of fuel and the lowest cost for piping.

The first thought seems to be that as the pipe is run up to the tank it will save piping if a proper connection is made so that the water will enter the bottom of it, for this arrangement not only saves the cost of piping the height of the tank, but it also admits of using the same pipe for drawing water off from the tank. But the objection is raised that if this is done the pump will have to force water against the whole body in the tank, and this will greatly increase the work on the pump. Let us reason the matter out and see if this is true. Taking the positive side of the argument, we must assume that the water in the body of the tank presses down with more force than it does in a small pipe set up alongside of said tank. If this view of the case was correct, of what use would the water gauges on

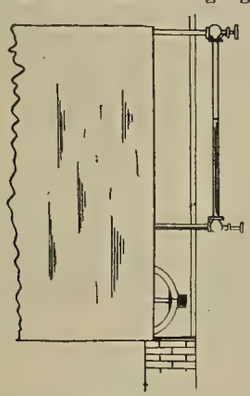


Fig. 1.

our boilers be to us? Fig. 1 shows a boiler-head with a water gauge on it, and we know that the water will stand at the same height in the glass as it does in the boiler, so that no argument is needed to convince us of this fact, but if the body of water in the boiler created a greater pressure than the same height of water in the small glass tube, then the latter would be forced upwards until the top of the glass was reached, and we could not tell where the water level in the boiler was, therefore the water gauge would be entirely useless.

Sometimes tanks are fitted up as

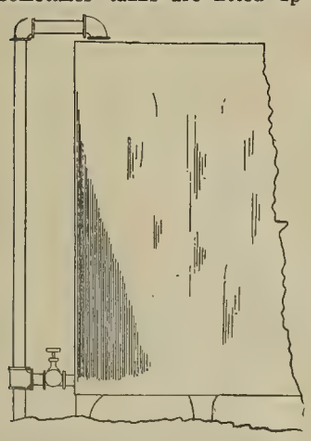


Fig. 2.

shown in Fig. 2, and when there is no water being forced through the pipes the height of water is just equal to that in the tank. From this it should be plain that it requires no more force to put water into the bottom of the tank than it does to force it to the same height in the pipe, and it follows as a natural consequence that it requires more force to put the water up through a pipe that extends several inches above the top than it does to put it into the bottom of the tank; therefore it is not only a waste of piping, but also a waste of fuel, in pumping against a greater head than is necessary.

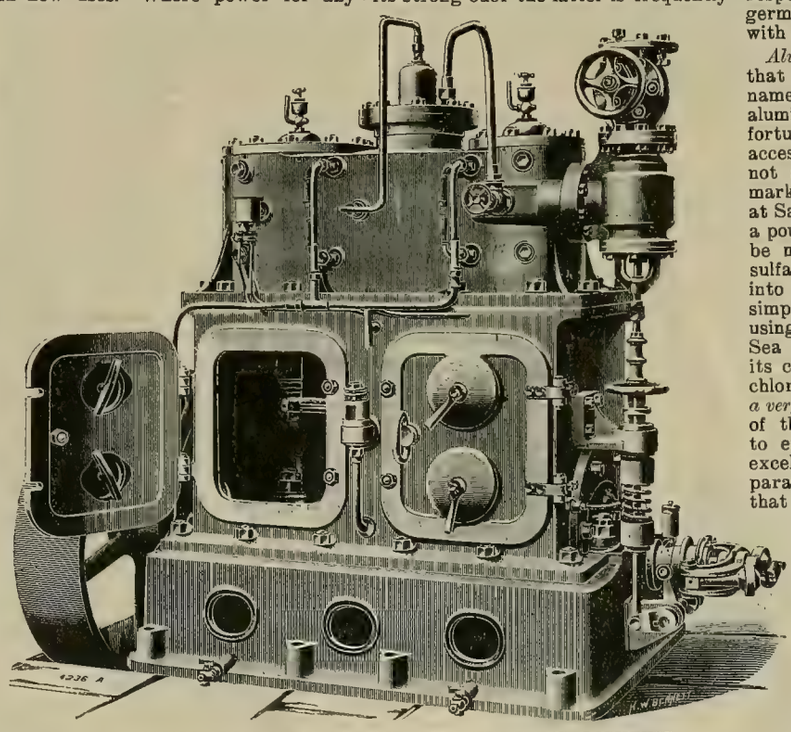
The writer once had charge of a plant where the tanks were fitted up in this way, and when the valve shown was open no water would ever appear at the upper end of the pipe until the tank was nearly full, when the pressure, being nearly equal, the momentum of the water coming up through the pipe would cause some of it to appear at the end of it, but never until the tank was nearly full. This is only one of the many cases where sound theory agrees with good practice, and should be a convincing argument.

It is quite possible for the piping to be so arranged that when the pump is running at a high rate of speed the momentum of the water will carry it up through the pipe and over the top of the tank, but this would not be a fair trial.

It requires some labor to make a good joint where a pipe goes into the bottom of a tank; but it is necessary to make it for the outlet pipe, therefore the best plan is to connect the discharge pipe from the pump directly into the outlet from the tank, as this is the least expensive plan and also the best way to get water into the tank with the least friction.

Upright Enclosed Engine for Electric Lighting.

The extreme flexibility of electric power is being demonstrated every day in new uses. Where power for any purpose must be used about a large building, or any place where work is being carried on, it has seldom failed to prove its availability and economy. In excavating for the Central London Railway—the railway that was equipped almost entirely with American machinery—the contractors found that it was most convenient to generate current and transmit it to the various points where power was required. The engine shown on this page was used, direct connected to a generator. The subway was lighted, the pumps of various kinds operated and several locomotives driven by the current. The engine is a compound, not of American type.



UPRIGHT ENCLOSED ENGINE FOR ELECTRIC LIGHTING.

A Timely Discourse on Disinfectants.

By PROF. E. W. HILGARD, University of California.

With the advent of warm weather the demand for disinfectants and deodorants for domestic and hospital use becomes pressing, especially in view of the dry season and consequent liability of the water supply to increased contamination, and also of a scarcity of water for flushing the drains and sewers. It therefore seems timely to discuss briefly the main points in the premises, adding some suggestions towards facilitating and cheapening disinfection, resulting in part from investigations made on the subject during the past season. These investigations developed several curious facts regarding preparations commercially sold for these purposes.

Deodorants and Germicides.—Attention should first be given to the fact that many *deodorants* have but very faint *antiseptic* properties; and that only a few of the preparations commonly known as *anticeptics* are true *germicides*, that is, actually *kill* the foul germs, so as to render them incapable of further development; unless used in such quantities as to be too costly. Of those that have passed into more general use, bichlorid of mercury (corrosive sublimate), bleaching powder or "chlorid of lime" and chlorin gas, and sulphurous gas (from burning sulphur), are the most energetic germicides as well as deodorants. To these should be added the lately introduced formaldehyde or formalin gas, either generated from a lamp causing the incomplete combustion of wood alcohol, or sold in solution.

The substances mentioned, all poisonous, readily kill not only all disease germs of bacteria, but also the various forms of the common mould, which are among the most resistant. Salicylic and carbolic acids in proper concentration accomplish the same end, yet are much less energetic, and on account of its strong odor the latter is frequently objectionable. The same objection lies, in an aggravated degree, against chlorid of lime, free chlorin and sulphurous acid. It is the absence of odor and almost of taste, that has brought salicylic acid into such extended use. Yet even a fairly strong solution of salicylic acid is readily destroyed by the common blue mould when proper nourishment is supplied. It stands on the line between true germicides and mere *antiseptics*, that is, substances which prevent or greatly retard the *development* of diseased germs and bacteria, but without *killing* them save on very long exposure. The ease with which salicylic acid can be introduced into food products without its being observed by the taste has led to a widely extended illegitimate use, and to a marked increase of dyspepsia among persons using canned and otherwise preserved fruits, fruit juices and vegetables. For the disinfection of drains and closets, salicylic acid, even if its price permitted, would be but a poor resort.

Sulfate of iron, commonly known as copperas, is a fair deodorant and antiseptic; but just as in the case of carbolic acid, the odor is a practical objection, so in that of copperas the ineradicable stains it leaves everywhere are a nuisance to the housekeeper. For water closets and washstands, a *colorless* and *inodorous* antiseptic of sufficient efficacy and cheapness is the great desideratum, so as to prevent the generation of "sewer" gas, the absolute killing of the germs under ordinary conditions being of less moment.

Relative Antiseptic Effectiveness.—Of such substances there is a considerable number among the mineral or metallic compounds available in commerce. The great domestic preservative is common salt; but its efficacy is quite slight as compared with a number of others, as will be best seen from the table below, showing their relative antiseptic efficiencies. The data are partly taken from standard works, partly derived from experiments made by Mr. Bioletti, in charge of the bacteriological laboratory.

ANTISEPTIC RATIOS:

Bi-chlorid of mercury	14,800
Free chlorin	4,000
Salicylic acid	1,000
Aluminum chlorid	714
Aluminum sulfate	640
Zinc chlorid (much used in hospitals)	526
Carbolic acid	333
Boracic acid	143
Ferrous sulfate (copperas)	90
Magnesium chlorid (bittern)	104
Calcium chlorid	25
Sodium chlorid (common salt)	6

It must be understood that these figures are merely relative and are not the same for all kinds of bacteria. Mr. Bioletti's experiments were made with respect to the common atmospheric germs, such as we have largely to deal with in sewage.

Aluminum Salts.—It will be observed that of the saline mineral substances named above, *aluminum chlorid* and aluminum sulfate stand highest; and fortunately these compounds are easily accessible in general commerce, though not at present in the San Francisco market. The sulfate can be delivered at San Francisco at about three cents a pound from the East, but can easily be manufactured on this coast. The sulfate can practically be transformed into the more efficacious chlorid by simple intermixture with common salt, using about equal amounts of each. Sea salt is preferable on account of its contents of bittern or magnesium chlorid; and *sea water can be made into a very effective antiseptic* by the addition of three pounds of aluminum sulfate to every ten gallons. This makes an excellent solution for the dripping apparatus for urinals and washstands that has found some acceptance, and it is vastly cheaper as well as many times more effective than the high-priced solutions usually recommended with which it has been experimentally compared.

Colorless, Inodorous and Non-poisonous.—A solution made by dissolving 3½ pounds of aluminum sulfate and an equal amount of common salt in 10 gallons of water is now in use at the University with excellent result.

It is found that it would take 120 pounds of aluminum sulfate to render 1000 gallons of average sewage completely sterile; but less than half that amount will prevent the formation of sewer gas, and the cost of thus deodorizing closets andurinals is almost nominal.

This "colorless, inodorous and non-poisonous" solution should be in abundant supply in all hospitals, soldiers' quarters and public institutions; and can readily be used in private houses as well, without danger of accidents. It can also be used as an astringent antiseptic wash for wounds.

Mining Summary.

CALIFORNIA.

Amador.

The Griesbach mine in Volcano district has about 200 tons of rock ready for the crusher.

This week at a Probate Court sale in San Francisco 5000 shares of the capital stock of the Kennedy M. & M. Co. of Amador county were sold at the rate of $8.73 per share to B. Doe.

Record: At the Potazuba mine, Sutter Creek, the ledge in the north drift at the 500 level has widened to 12 feet. On this lode it is estimated that a low-grade vein has to carry about 15 feet of ore in order to pay, and the Potazuba promises to exceed this size. Supt. J. Ross, Jr., of the Wildman-Mahoney, has charge of the work at the Potazuba.——J. H. Wise of San Francisco has purchased an interest in the Amelia Co, Jackson. The shaft is down 610 feet and sinking is progressing. It is intended to sink 1000 feet before drifting.

Butte.

The Boulder gravel mine, near Nimshew, is in operation.——Work continues successfully at the Black Leg mine.——The Silva Co. at Cherokee has finished cleaning the tunnel and is preparing for another run.

Calaveras.

P. L. Shuman of Chicago purchased the Empire gravel mine near San Andreas, containing 79.7 acres, for $4000.

The Rose Hill mine at El Dorado is opened again by the new company who bought it from the Rodesino estate. It is understood they will build a new stamp mill, as the old one proved a failure. Men are working the mine.——Work at the Live Oak mine is in progress. Ore recently taken out assayed from $30 to $150 to the ton. The ledge is 4 feet wide. The owners may put up a new mill as soon as a sufficient amount of pay ore is at hand.——The Maine mine, formerly known as the Tindall, has been prospected with favorable results. The ledge is being developed and good ore was struck which shows plenty of sulphurets. The rock goes from $10 to $100 to the ton.

Work is being done in the lower tunnel of the Washington mine, near Murphys, to determine the value of the quartz at depth. Rich quartz has been extracted. Some shipped to the Selby Smelting Works ran as high as $700 a ton. A Colorado company has a bond on the mine.——The De Lay tunnel operations are conducted day and night with good progress.——A 2-foot vein was struck in the tunnel of the Fricot mine at Esmeralda.——The San Francisco company that bonded the Bald Hill mine, near Albany Flat, have unwatered it and are engaged in stoping the ore, which proves to be of good grade.

Del Norte.

Record: At Crescent City the shares of the Union copper mine, advertised as delinquent, were sold at public sale by Sheriff Bailey. They were bid in by J. A. Johnson in the name of the U. C. M. Co. for the amount of the indebtedness, $1365.50.

El Dorado.

(Special Correspondence).—The Limpensel mine, being developed under bond by Diamond & Gehricke of San Francisco, has struck a valuable ore body in a crosscut on the 200 level. This is another of the properties in this vicinity that was surface worked for pockets in years agone, but present practical development is showing good results. This mine is but fifteen minutes walk from the courthouse. It has good water facilities.

The Gentle Annie mine is taking out good ore from the 400 level. The sulphurets are of good percentage and fair value. The cyanide plant at this property is about completed.

Work at the Griffith Con. Co.'s property, near Diamond Springs, is making favorable headway. Grading for the new 20-stamp mill, the installation of the 100 H. P. electric plant, and the development of the mine, are apace with vigor and enterprise.

At Grizzly Flat, the Eagle King 10-stamp mill is running on good ore from this property, which is improving with deeper workings.

The Sutherland 10-stamp mill is crushing a good quality of cement gravel. The holdings of this company cover a mile of channel.

The Crown Point and Lone Star mine, two miles south of Diamond, is rushing work in both shaft and tunnel. The company, Scotch capitalists, closely allied, it is said, to the Jumper of Tuolumne and the Griffith Con. of this county, is systematic and enterprising in the development of these properties.

The Boulder mine, near Shingle Springs, is proving an excellent dividend payer as work progresses, though in the early stage of its resumed development, after a lapse of years, the present operators had concluded to cease further work but were otherwise persuaded by their sanguine Supt.

The Hall Con.—cutting its way by a long tunnel through the Mierson Con. group, which had been abandoned by is former operator at 450 feet—is showing good results as work progresses. The property adjoins the Gentle Annie and is on the lode and in close proximity to the Skinner and Limpensel properties, which are both proving a success. A crosscut at 470 feet in the tunnel shows a 30-foot wide vein, of which 15 feet wide averages $8.45 by mill test. There is in this a streak that runs in kidney shape of from 1 to 12 inches of specimen ore. The tunnel cuts the footwall vein at 300 feet depth. The north drift is 220 feet, of which 100 feet are in ore.

The Big Sandy and Sunrise at Kelsey are running ten stamps each on a good ore product.

The Esperanza at Garden Valley is credited with a good output of fair grade ore.

The sale of the Taylor mine has not been accredited thus far in Placerville, though it is definitely known that work in the property has ceased.

Placerville, June 13th, '98.

Kern.

The Napoleon mine, at Randsburg, has reached a depth of 170 feet. From twenty tons of ore milled they received $2000. Over $28,000 have been taken the past year.——The Ophir mill at Cuddeback lake made a run of two and a half tons of ore from the Santa Ana mine, which turned out $140.——The Eureka mill, Randsburg, two stamps, has turned out more than $13,000 in bullion the past month.

In the Badger mine, at Rademacher, at 150 feet depth the ledge is 6 feet wide and assays about $25 to the ton.——The Yellow Aster Co. expect to use ten stamps at the Red Dog mill and fifty stamps at Barstow.——The Black Hawk mine, midway between Randsburg and St. Elmo, will ship eight carloads of ore.

Madera.

(Special Correspondence).—The machinery at the Lily mill is being overhauled and improved preparatory to starting up when the pipe line is completed, which will now be at an early date.——Messrs. Peters & Hanshew have removed their 3-stamp mill from the Keating mine to Fine Gold creek, one and one-half miles from the mine.——Four men are working at the Gambetta. The upraise in the Last Chance is within 20 feet of the old winze, which is to be tapped.——A concentrator will be added at an early date to the 5-stamp prospecting mill at the Starbuck mine.——Leroy F. Mitchell has opened up the Magnet lode on the Yankee Boy location and has found the characteristic features of talcose slate with veins of quartz carrying sulphurets and some free gold. At the Safe Deposit location, on the same lode, there is now fifteen tons of ore on the dump, much of it showing coarse free gold and all of it heavily sulphuretted.

Gold, June 14th, '98.

Nevada.

The Phœnix M. Co., operating the old Sneath & Clay mine, which had been abandoned for several years, have come into an ore body of good value.——The claims owned by the North Star M. Co. at Grass Valley produced $319,234.41 during 1897, of which $281,099.48 was the yield of the Stockbridge mine; the remaining $38,134 98 was the product of the old North Star mine. The net addition to the cash resources from the operations during 1897 was $107,020.85; cash on hand January 1, 1898, $179,617.70. During the first three months of 1898 the value produced from the Stockbridge has amounted to over $102,000, with a realized profit of about $40,000 to $45,000. The company's available cash resources amount to more than $250,000. The bullion production of the North Star M. Co. from the date of its incorporation in 1884 to January 1, 1898, has amounted to $2,839,148.91.——A meeting of the stockholders of the Delhi M. Co. will be held at the San Francisco office next Thursday to consider the expediency of a voluntary dissolution of the corporation.

The Blue Bell G. M. Co., located near Washington, has filed a suit in the U. S. Circuit Court for an injunction restraining the South Yuba Water Co. from using a flume which the defendant has run from a point on Fall creek. The Blue Bell people claim a prior filing on 500 miners' inches.

Work has been resumed on the McKinley mine near Moor's Flat.——The Buck Bros., Moor's Flat, it is said, contemplate building a 5-stamp mill.——A vein of good ore has been struck in the Sleeping Beauty mine near Columbia Hill.

Union: In a few days the hoist and pumping plant at the Omaha mine will be run by electricity, applied direct. This is the first application of electricity used in this way in the district, and success is watched by other companies who are thinking of using electricity. Supt. Mainhart is very conservative in speaking about the Omaha, but says it shows considerable improvement.

Transcript: Nibell & Co., who have an option on the National Pride quartz mine near Graniteville, are making good headway with their prospecting operations.——The Delaware drift mine on the Harmony ridge at Nevada City is about worked out. It has for a long time been operated to a profit by R. McMurray & Co., the owners, but labor will soon be suspended there, as that portion of the channel lying within the boundaries of the location is about exhausted.

Placer.

Work has resumed in the May Flower mine, Forest City.

Leader: J. A. Bank and two sons are taking out $15 rock at the Big Pine mine, near Auburn. They have taken out 125 tons, 50 tons of which have been milled and gave good returns.

Plumas.

San Francisco people are examining the Green Mountain group of mines at Crescent with a view to resuming work.

The Plumas Eureka is not operating, and it is generally understood that the owners will not resume work.

The hydraulic mines about Johnsville, owing to the dry season, have not produced the usual amount of gold.——Work at the Four Hills mine is progressing.

Rogers & Co., working a drift mine near Quincy, took out a nugget weighing $1200.

Bulletin: At the Jamison mine near Johnsville twenty stamps are running on profitable ore. Over thirty men are employed and operations proceed upon a systematic basis. Sam W. Cheyney is Supt.

San Diego.

H. H. Douglas, representing Eastern people, has secured a working bond on the Bay Horse mine, situated in Mesquite district, near Hedges. Crosscutting and drifting on the 115-foot level is in progress. There are three shafts on the mine, which, together with surface cuts, show an ore body 90 feet wide, 600 feet long and 115 feet deep. The new company will pump water from the Colorado river through eighteen miles of pipe and erect a 20-stamp mill. They expect to be milling ore by December 1st. There are other mines in the district which will be worked after the pumping plant is established.——The Golden Dream Con. M. Co. has sold to the South Jersey D. Co. the Golden Dream group, Oro Blanco group, Noonday group, Capella group, Pleiades group of mines, and the Emilio and Gold King mill sites.

Receiver C. W. Pauly of the Golden Cross M Co. at Hedges has filed his sixth report. He cleaned up $45,018 61 in gold bullion as the result of the April run. During the same month he received $1428 60 from other sources, making the total receipts for April $46,447.21. He has paid since out $42,323 06 for the company, which included $11,500 paid to creditors, and on April 30th had $55,941.02 on deposit. The cash to be paid on April claims amounts to $21,500.

A strike of petroleum is reported near Encinitas on the property of P. Lux, who was boring for water. When down 150 feet a vein of coal was encountered, which, when pierced, gave out a good flow of oil.

Shasta.

The prospecting of the copper property on Stillwater by the New York company, W. Kemp, Supt., has progressed favorably. Several prospect shafts are being sunk, and in one shaft there is high-grade ore sufficient to warrant sinking as soon as the inflow of water can be handled.——A shipment of ore from the Washington mine, near French Gulch, taken out by leasers, was sent to the smelter.——Three and a half tons of ore w brought last week from the Bremer & McManus mine, near Carrville, and shipped to smelter.——A company of capitalists from Tacoma, Washington, purchased the Deming mines, near French Gulch. They have been incorporated under the laws of the State of Washington.

Sierra.

The Bojorques mine, near Downieville, looks well in the face of the tunnel, in 100 feet. The ledge is from 2 to 5 feet wide and the ore runs from $10 to $15 per ton. There are 200 tons of rock on the dump.——The ledge has been struck in the lower level of the Plumbago mine with favorable indications.

Siskiyou.

The Mississippi is the only mine running at Seiad. Two giants are in operation the year round. It is paying well.——Work on the new wingdam near Hamburg Bar is progressing.——D. W. Jones last week brought to Fort Jones 107 ounces of fine gold, the result of three days' run of his mill in Quartz valley.

Work in the Pacific mine at Humbug, Klamath river, is progressing despite the trouble in setting the cribs, owing to quicksand.——At the Quinne & McConnell claim, Klamath river, the top ground will soon be cleared, when day and night work is to be commenced.——The Slide mine, at South Fork of Scott river, has been put in order for successful working by A. Bouvier.——The water supply is holding out well in the Oro Fino section of Scott valley. The Eastlick and Wright mines, under the superintendence of O. S. Rusby, are worked with good success. Gardener, who also works in the same vicinity, is keeping his giants in operation with a good supply of water.

News: The Uncle Sam mine near Yreka will be unwatered and development resumed.——The Neversweat mine is in operation with a full force.——The Glendora quartz mine is producing ore that nets $7 per ton.——The Mountain Bell mine in Humbug district is working on a 30-inch ledge of $15 rock.——Work will be resumed shortly on the North Star mine.——The Deer Lodge mine in Humbug is operating on an 18-inch ledge of $12 ore.——The Boyle mine has forty tons of ore on the dump, of good grade.

Trinity.

In the Boulder mine, near Cinnabar, a ledge has been cut that has 2 feet of quartz that yields a good prospect, and 6 or 8 feet more that is heavy in sulphurets and carries a good per cent of copper.

Tuolumne.

Democrat: In the Gagnere, Sonora, a new ore chute was developed. Two assays gave $450 and $437 respectively. The force was increased and the drifts rushed farther south. The ore body is now from 7 to 20 feet wide, and indicates one of the most valuable developments in the county.——Davis & Starkweather have temporarily discontinued work on the Osceola. The vein was tapped by a crosscut tunnel after driving 40 feet, and then drifted on 121 feet more. The rock mills $75 per ton, but the ledge is small.——In the Carlotta and Pennsylvania mines, both owned and operated by the same company, work is confined to drifting on the 200 levels. The vein in both mines is from 14 to 30 inches wide. The ore, especially in the Carlotta, is high grade. Supt. Neagle has not decided when he will resume sinking, probably not until the contemplated mill is completed.

Magnet: Work has been commenced on the 2000-foot shaft on the Jumper near Stent.——The Bonanza mine near Sonora has reached a depth of 1800 feet on the incline. There are from five to ten tons of high grade ore on the dump.

Tulare.

Sorrels & Russell will erect a 2-stamp mill on the Vulture mine, near Porterville. There are 100 tons of ore on the dump.

Yuba.

Democrat: There is no underground work being done in the mines of the Webb Co. and no indication of work being resumed.

NEVADA.

The Chainman mine and mill, near White Pine, were shut down temporarily for repairs to the pumps and to make a test run of 150 tons of ore from the Jupiter mine.——Steam wagons are to be put in use from the Eyrie mines in Tuscarora, such as are used at the De Lamar mines. From these mines ores of the value of $200,000 were marketed at Salt Lake valley smelters before the present owners acquired possession. The original owners extracted only such ore as was of a very high grade. Nothing that did not afford more than $100 was broken down. The result was that a large amount of low-grade ore was left standing. Much of this shows a valuation of $90 per ton. To market this it is necessary to pay $10 a ton for a haul of fifty-two miles from the mine to Elko, where a connection is made with the railroad.——At the North Mountain mine, Cherry creek, the crushers that were started up recently are handling fifty tons a day of a class of ore that affords a good margin, and this tonnage is to be increased.——The borax teams arrived at Winnemucca from Oregon with 36,000 pounds of borax.——Copper ore is being hauled to Wells from the Salmon river country nearly every day and shipped west.——H. W. Ely took to the Carson mint a bar of bullion from ore from the Mayflower mine, in Como, which was obtained from eleven tons of ore worked at the Wilson arrastra, and gave returns of $55 per ton.

The May payrolls for the Comstock foot up to $53,955, about $3000 less than for the month of April.——The De Lamar *Lode* says that an ore body 100 feet wide has been discovered in the April Fool mine.

OREGON.

Baker City *Democrat*: The mines of the John Day were never more productive than this season. There is plenty of snow, and, therefore, plenty of water. Within one and a half miles of Susanville there is still 6 feet of snow on the mountains. Mines are running in full force on California gulch and Happy Camp and are paying good profits. Some nuggets taken out of California gulch go from $5 to $8, and some taken out on Vinson creek go $8.

WASHINGTON.

Rich ore continues to be shipped from the Republic mine to the smelter.——The tunnel on the Jim Blaine at Republic is being driven at the rate of 40 feet a week. The tunnel is in 300 feet.——In the San Poil the ore runs as high as $80 per ton.

The final payment on the Golden Harvest group of claims in Eureka district, which was bonded by J. M. Burke and associates, has been made. This completes the payment of the purchase price of the property, which is said to have been $20,000. Recent reports from the group are to the effect that development is daily adding to the value of the property. The ledge is said to be large.——The Butte & Boston has a pay chute that is over 100 feet long and samples over $20 per ton.

BRITISH COLUMBIA.

A Rossland report says the Le Roi deal remains unchanged. The company at its statutory meeting to act upon the offer of the British America Corporation to purchase the mine for $3,000,000, adjourned until June 27th, when the stockholders will again get together. The de'ay arose over the trusteeship of the pooled Le Roi stock, which includes 427,000 shares out of the total 500,000 shares. The pool was entered into about eighteen months ago when different factions of the company got together to the extent of 427,000 shares which were placed in an iron-clad pool for ten years, under the trusteeship of Turners and Peyton.

In the upper tunnel of the Emily Edith, Slocan, a body of ore was cut 3 feet wide, 1 foot of which is clean shipping ore.——A new strike has been made on the Fidelity. It is said the ore will average over 100 ounces silver and 50 per cent lead.——Five inches of clean ore has been struck on the Mountain Lily, one of the Roulette group.

The final payment of $27,000 on the B. C. mine in Summit camp has been made by A. H. Harrison, representing the purchasers, to John W. Keogh & Sons. The purchase price was $60,000. Since the bond was taken, about a year ago, almost 700 feet of work has been done and 1200 tons of high grade copper ore is on the dump.——Dalrymple & Carmichael, the owners of the Flora group in Fairview camp, have bonded the property to Ritchie & Stewart for $15,000.

The Whitewater Deep is taking out ore and expects to begin shipping shortly.

Mackenzie & Mann recently bonded the Big Patch group near Ymir for $45,000 for 30 days. Darrow & French, the owners, retain a one-fifth interest in the property. Considerable development work has been done on the property, which shows up a ledge 4 feet wide of good ore. Mackenzie & Mann will develop the property as rapidly as passible.——In the Van Anda mine on Texada island a strong chute of ore has been struck. The vein matter is about 12 feet wide, nearly 6 feet of which is showing the bornite copper ore characteristic of this property. The work of crosscutting at this point is not yet finished.

On Anderson lake, Vancouver island, development work is progressing on the properties owned by the B. C. Gold Co. The croppings on these claims are from 30 to 60 feet wide and can be traced for a long distance.——On Alberni canal several copper claims are being opened near Namint bay. On one of these is a showing of good vein matter about 10 feet wide containing copper ore of shipping value.——At Sydney Inlet, in the Clayoquot district, a large amount of development work is being done on copper claims. Much of the ore in this section is a mixture of bornite and chalcopyrite and contains gold.

On the Fidelity property, Slocan, the ore chute has been uncovered. Work is being pushed on the tunnel.

Kootenaian: Four feet of ore has been discovered under what was supposed to be a footwall in the Whitewater mine near Kaiso. The accepted footwall proved to be only a foot of spathic iron.——A. B. Irwin, Mgr. of the Canadian Pacific Expl., says his company will build a 10-stamp mill and a five drill compressor on the Porto Rico near Ymir. An aerial tramway of 2500 feet is to be constructed to carry the ore from the mine to the mill. The ledge, which has been opened at three levels by tunnels, is producing good concentrating ore.——Work is being pushed on the Gold Queen and Mulligan claims near

Ymir. The lead on the Gold Queen can be traced for 1000 yards and is 5 feet wide. The pay streak, which is now about 9 inches wide, is getting wider as work advances.

ALASKA.

Alaska *Miner*: On Prince William sound, near Fort Fidalgo, a company known as the Prince William Sound M. & D. Co. is conducting mining explorations and developments. This company has a capital of $600,000. Ex-Marshal L. L. Williams is Pres.

At King Solomon's Basin, on the main creek, are thirteen claims which will be worked hydraulically. Each claim contains twenty acres. The company has also a quartz mine on tide water which has not yet been opened up. The placer property is advantageously situated for economical working, being only one mile from the harbor. A tunnel will be driven this summer to drain the claims.

The Copper Mountain M. Co. has been organized to work properties at Fort Fidalgo. The company has a copper ledge which at a point five miles from the beach is 75 feet wide and it comes twice to the surface between these two places. At the beach the ledge shows up 500 feet above the water. Development work on this property will continue all summer.——The Pande Basin Gold Placer Co., with a capital stock of $2,500,000, has been formed, with M. L. Muhleman, cashier of the Sub-Treasury, New York, as Pres.

UTAH.

The Congor mine at Bingham reports the presence of ore showing 21 per cent copper, seventeen ounces silver and $4 50 in gold. Of this class of ore there are 14 inches in a vein that is 9 feet wide, and from which several shipments have already been made, the last lot showing as much as 22 per cent copper. In addition to that which is now being shipped there are several feet of second-class ore that would yield good margins in a concentrate. Meanwhile development work is being done on the ground and it is not unlikely that concentration of the second-class will be provided for before the end of the year.——The Keystone, in Pine guich, in West Mountain mining district, is marketing 200 tons of ore under the Elmer Hill lease, and the property is in good condition. The ores carry copper, silver and lead.——The Julia Dean is handling its second-class ores through the Heaston jigs at Bingham, which give the owners a product of the value of about $35 a ton.

The shaft on the Martha Washington at Silver City is to be put down an additional 200 feet before further prospecting is undertaken, although the management will continue to break down and make periodical shipments of a class of ore that affords good margins. The putting down of the shaft 200 feet farther will carry it to a depth of 500 feet, and at that point crosscutting to the vein will commence.——E. G. Heffron, prospecting the South Daisy group on the West Dip, says that experiments show that a ton of ore in that locality can be cyanided at an outlay of 20 cents for the chemical, and that the ore can be extracted, crushed and placed in the tanks at a cost of 75 cents, or a total of 95 cents per ton for leaching.——Bingham representatives of Captain De Lamar are devoting sixteen hours a day to experiments on the ores from ground recently tied up by them in the Giant Chief mill. Samples show the presence of a copper pyrite in the porphyry.——Near Marysvale a vein has been found in the Eagle mine which is 2½ feet wide. A pay streak from 8 to 10 inches wide has been struck which carries a high grade tellurium gold ore. The lowest assay runs $28 gold and twenty-four ounces silver.

Tribune: The monthly dividend of the Mercur mine has been reduced from $36,000 to $25,000. This action is not looked upon as any confession of weakness on the part of the mine, but simply the enforcement of a policy to which it was known the company would return as soon as the $237,000 derived from the sale of the Resolute fraction to Capt. De Lamar was divided among those entitled to it.——The last shipment of cyanides from the Geyser-Marion at Mercur amounted to $6182.——There are nine mills in the Mercur district—the Golden Gate, Mercur, Sunshine, Sacramento, Northern Light, Chloride Point, La Cigale, and two on the Geyser-Marion. More are in contemplation.——The Grand Central mine at Mammoth shipped a trainload of high-grade ore to the smelter.——The Sacramento at Mercur made a shipment of auro-cyanides, the value of which is about $8500.——Fifty men are working at the Uncle Sam at Eureka. The main shaft is down 600 feet. Between the 200 and 300 levels a 4-foot body of lead carbonates has been followed a distance of 125 feet, and about twenty-five tons a day are being shipped. Assays from this ore show a value of 60 per cent lead and forty to fifty ounces in silver.——The Last Chance mine at Bingham made a new strike on the 500-foot level of a 2-foot wide vein that has an 8-inch filling of galena and the balance carbonate. From the galena an assay was obtained showing 41 per cent lead and 123 ounces silver, while the carbonate showed 8 per cent lead and seventy-three ounces silver.——The Marsac mill at Park City is running an average of eighty tons of Ontario tailings every twenty-four hours.——About fifty-five tons of ore is brought down on the Crescent tramway each day, and there are five lots down ready for shipment. Before the ores which are already hoisted from the workings are all brought down the total will reach nearly 4000 tons, and this will require over two months to move. The ore runs high in zinc and lead. Over 300 tons of ore have been shipped by the Ontario Co. within the past two weeks, and yet the men employed are only doing prospecting work.——The Tintic *Miner* reports the shipment of eighty-five cars of ore, ten cars of concentrates and twenty-seven bars of bullion.

Mercur *Miner*: The Tioga Co. has purchased the Susquehannah claim, adjoining the Tioga group. There are thirteen claims in the Tioga group and they are in the mineral belt embraced in the Chloride Point and Hercules properties. Three hundred feet of work has been done on the Tioga group and 100 feet on the Susquehannah, and a good showing has been made. Values ranging from $1.64 to $7.20 have been uncovered.——The Hercules mine at Stockton marketed a shipment of ore which showed 53 per cent lead and seventeen ounces silver per ton.——The Washington mine of Frisco marketed a lot of ore showing 60 per cent lead, 135 ounces silver and $12 in gold per ton.

Tribune: Mining men claiming to be conversant with the ore bodies that have been blocked out in the Resolute fraction since its acquisition by Captain De Lamar, say that at $237,500, which was paid the Mercur, the actual cost represents about 50 cents a ton, including the work of development. It is known that since the purchase of the strip, which consisted of less than seven acres of ground, Supt. Duncan has been actively prospecting it, and that already two chutes of ore, if not a third, have been encountered. It is said that in one place the ore body is nearly 40 feet and that the values are equal to any that have been encountered in Mercur ground.——The ore bodies in the Columbia at Lion Hill are improving, and the management promises to add it to the list of shippers shortly.

IDAHO.

Excavation for the Poorman mill at Florence is nearly completed and it is probable that the stamps will be dropping on ore by July 5th.——In the Nancy Hanks 2 feet of chlcride ore has been found which assays 400 ounces silver and $12 gold.——The Lake Creek Placer Co., operating near Warm Springs, is reported to be working day and night with men.——The cyanide works at the Camas No. 2 mine are in operation. They are, however, doing 50 per cent better than last year. Last year the tailings put through was about thirty tons per day, but the quantity now is between forty-five and fifty tons. It will be increased to sixty tons per day, and in the warm season to seventy-five tons.——A carload of North Star ore was shipped from Picabo last week.——Bradley & Halterman bought the Franklin and Vixie mines at Pine Grove for $20,000. It is their intention to start development work on an extensive scale immediately.——The dredge of the Basic Co. at Placerville has been launched. It is 40 by 100 feet. The placing of the machinery in position will begin immediately.——J. C. Dougherty of Challis writes that uranium ores have been found there.

Gov. Tanner of Illinois; J. W. Gates, Pres. Illinois Steel Works, Chicago; W. Palmer, Vice-Pres. of that company; J. A. Drake, Treas. Illinois & Indiana Railway; and T. S. Woods, a Colorado mining man, made a visit to Warren mining camp, where they purchased the Iola mine. A 10-stamp mill is being erected at the mine. They report that a 30-inch ledge of rich ore is at a depth of 200 feet.——The plant of the Idaho Antimony M. Co. is to be enlarged, the process having proven successful. The plant was experimental. The first lot of crude antimony was shipped to the refinery in New Jersey. It has been demonstrated that the flower of antimony can be extracted from the ore.——The shaft and drifts in the Jupiter mine, near Idaho City, have been cleaned out. There is $2500 worth of ore on the dump.——The Blue Bird is making a good showing. It has a vein 15 inches wide of ore that will mill $150 per ton. The mine was worked over thirty years ago and abandoned. It remained idle until two years ago.

Mt. Home *Republican*: The Shields mining property at Rocky Bar has been sold to Denver parties. It is the intention of the company to expend $100,000 in development work, beginning this fall. The Shields mine is considered one of the best in the district. A mill run of forty-one tons averaged from $60 to $65 a ton.

World: Five teams, eight and ten-horse, pulled through Idaho City last week loaded with machinery for the dredge at Placerville. One piece, a revolving grizzly, weighs 8950 pounds. The dredge will be run by a 500 H. P. dynamo, which will be placed on Grimes creek. The foundation for the dynamo weighs 20,000 pounds.

The *Tribune* of Wallace reports the bonding of the Flynn group of claims in the Cœur d'Alene district for $250,000. Sixteen claims are embraced in the deal. They extend for more than a mile and a half from the Black Bear mine towards Mullen. Practically no development work has been done. Four per cent of the price fixed in the bond is to be paid at once, 46 per cent in sixty days and the balance in a year.

Avalanche: The test run of fifty tons of Poorman ore, Owyhee, was highly satisfactory to the Mgr. The plant is now running at its fullest capacity, ten tons daily, and is said to be saving the values very closely.——The Empire mine will be cleared to the fourth level and the drifts extended. The long idleness at this property necessitates overhauling of machinery and replacing of timbers, but the work is progressing rapidly and mining operations will soon commence.——At the Cumberland the mill is running steadily and bullion shipments are regular.

MONTANA.

The Hope mine at Basin has been temporarily closed, to be started up again when the company gets ready to carry development work ahead. The lead was cut at the 400-foot level, where the ore proved to be richer than that found on the 300 level.——The Buffalo mine at Rochester is working eight men.——The Bertenia mine at Rochester has about 400 tons of silver ore out ready to be treated.——The old Watseka mine, Twin Bridges, is being worked by a number of leasers who ship a carload of $60 ore a week to the smelter.——In the Thistle M. Co., near Rochester, since May 1st, the output has been ten tons weekly of first-class shipping ore. The development work of the past few months has demonstrated the continuation of the rich ore body. The first-class ore is shipped and the second-class is treated in a cyanide and concentrating mill.——The Elgin mine, near Rochester, employs fifteen men. An ore body running from $20 to $30 has been opened up, and the product is about ten tons daily.

Thomas & Heath have given a bond and lease of the Howard, near Helena, to H. A. St. Earl for $10,000, and the lease on a royalty of 35 per cent. Some rich ore has been taken from the Howard; there is a vein of 14 inches, some of which has been tested and found to be worth from $350 to $400.—— Precipitates weighing 4586 pounds were shipped from the cyanide plant at Marysville. They are valued at $32,200, and form the May run.——The Clark's Fork gold dredging boat, near Red Lodge, is ready for work. The suction dredge has been replaced with a dipper apparatus, the machinery improved and the sluice boxes placed upon a scow behind the boat. A trial run was satisfactory.——It is estimated, says the Philipsburg *Mail*, that there are at least eighty men employed by the Con. Granite-Bimetallic Co. in Granite alone, and it is also claimed that inside of two or three weeks the force will be augmented. Report has it that the company is running a drift from the 1000-foot level of the Bimetallic, which will tap the Granite shaft at about the 1350-foot level. They have been working on this drift for over a month, and it is claimed that a couple of weeks more will make the connection.——The Montana Ore Purchasing Co. is doing development work on the Parnell, the Nippur and the Cora claims—all in the center of the rich copper belt of Butte and surrounded by some of the heaviest producers in the camp. The Anaconda Co. is installing the new engine in place of the old one, which has been in use at the Anaconda mine since 1882. The Original Stewart and Colusa-Parrot mines of W. A. Clark are all producing the regular output of ore.

At Pony sixty-five stamps are dropping and every leaser in the camp is making money. At the Mayflower, original location, eleven men are taking out ore. At Mayflower No. 3 eighteen men are at work. It is said that in this mine there are 12 feet of $100 ore in sight.——The first carload of ore from the Snow Shoe at Libby, for the season, was shipped last week. A big force of teams is on and the ore will come in with a rush the rest of the year. The output will be greater than last season. In the vicinity of 400 tons of concentrates are ready for transportation, and more than 1000 tons of ore are broken and ready for the mill.——A find of rich ore is reported from the Little Lottie claim, near Clancy.——The Townsend *Messenger* says that interest in the old Greyson creek leads is revived and men are extracting ore for shipment.

Intermountain: The Mayflower mine, near Whitehall—a remarkable gold producer for the amount of development work done on it—is looking well at a depth of 480 feet. The ore body has been nearly lost once or twice after hundreds of thousands of dollars had been taken out in high-grade gold ore, but with further developments it was again caught and the theory that the mine was a big surface pocket and did not go down has been long since abandoned. The mine is owned mainly by W. A. Clark, who purchased it from the original owners with two other adjoining claims for $150,000. The ore is of such a nature that no prospector ever thought it had any possible value and the place has been tramped over for years past. The three young men who owned the claim had already taken $60,000 from the mine when Mr. Clark made the offer of $150,000 for it. Many times that amount in gold has been taken from the mine since that time, however, and the workings nearly 500 feet down from the surface show a good continuous ore body.——With the Parrot Co. the Little Minah shaft is still sinking, all other work for the present being abandoned.——At the meeting of the Parrot S. & C. M. Co. the work of Gen. Mgr. R. D. Grant in opening up and developing new properties was endorsed. Development work will be resumed on several properties. Work is now in progress at the Bellona and Little Minah. In a few weeks work will be commenced on the Moscow, Oro Butte, Autocrat and Banker, near the Poulin property. The smelter at Parrot will not be operated this year, but Mgr. Grant was instructed to complete the improvements under way. Mgr. Grant's report for the eleven months ending April 30th was submitted. Dividends amounting to $281,841.25 were paid during the year, leaving a surplus of $1,620,998.24.

SOUTH DAKOTA.

In the Gold Coin shaft in the Dansby district, near Custer, a 9-foot vein of payable ore is being explored and the erection of a mill to treat the ore is contemplated. Upon the Lizzie group operations are continued with good results. The shaft has reached 150 feet and the ore carries good values.

COLORADO.

CHAFFEE COUNTY.

The Mayflower group in the Badger section has a 100-foot shaft in which is a 4-foot vein of hematite and amethystine quartz carrying about $35 in gold value. The shaft will be sunk to a greater depth before any extensive drifting is done.

CLEAR CREEK COUNTY.

Leasers at the Toledo mine, Idaho Springs, are getting out a shipment of smelting ore that will run $125 per ton for the carload They are also moving a second-class ore that nets $50 per ton.

EAGLE COUNTY.

A shipment by lessees on a Battle mountain property of 13,583 pounds of ore, ran 141.85 ounces of gold, 118.2 ounces of silver and 10 per cent iron excess. The royalty amounted to $4700 and after paying that amount and all other charges, the lessees received $19,173.23 as their profit.

EL PASO COUNTY.

The April report of the Isabella Co. has been made public. They shipped 1038 tons, which returned $25,087.45 net. The mine expenses were $14,817.89 and the sum of $9493.78 was paid lessees and part owners of the Comet claim. Office expenses were $389 35, leaving $377.43 net profit for the month. On May 1st the treasury reserve was $103,676 47.——Since May 1st the Uintah tunnel, Victor, has run 230 feet and cut six veins of low-grade gold ore. They expect in the next ten days to cut the Uintah vein opened in the Necessity. They have during that time shipped 100 tons of medium grade ore. Rapid progress is being made with development work.——McCormack & Co., who are operating the block of ground known as the Linday, under lease and bond from Bennett & Myers, are shipping about a car of two-ounce ore every day.——The Moon-Anchor, Cripple Creek, is keeping up an output of about 150 tons weekly of ore worth $60 per ton. The latest shipment—seventy tons—ran up to $90. The shaft is down 500 feet. So soon as the new machinery is completed the property will increase its development.

LAKE COUNTY.

Record: The Yak M. & M. Co., working a large acreage through the Yak tunnel, are increasing their output. Five railroad cars are sent out daily, besides considerable development work kept under way. All mining is done at a minimum expense on these workings.——The Mab mine in Graham park is driving two drifts at a depth of 1000 feet. Four shifts are working six-hour shifts in each drift. It is thought that by July 1st the ore shoot should be opened.——The Penn M. & L. Co. is operating in the Breece hill camp from two shafts, the Breece, which is 800 feet deep, and the Philadelphia. Shipments are heavy from the Philadelphia. The company has decided to erect a large cyanide plant at the Breece shaft.

LA PLATA COUNTY.

In the Last Chance mine in Silver City basin, workmen broke into an ore streak that is 16 inches wide and runs twenty ounces in gold per ton. There is a carload of this grade of ore sorted and ready to ship. Two tons a day are being taken out.——All the mines are working full capacity. After July 1 there will be two more added to the shipping list. On one of these the owners are taking out ore from a 2-inch pay streak that is said to run $1200 a ton.——The East and West Mancos placers have commenced operations.——On the Oro Fino side of this district there is much activity. The Graden M. Co. is working the Neglected group under bond and lease. From mill tests made the ore runs $23 in gold, $9 on the plates and $14 in concentrates. It concentrates eighteen into one with an 88 per cent saving, making a rich product of concentrates.——The Durango Boy and Girl make their monthly shipment of high grade ore that runs from $3 to $4 a pound. The lessees are piling up their low-grade ore, intending to sell it in bulk to the smelters. This second grade runs over two ounces gold and twenty-seven ounces silver a ton.

PITKIN COUNTY.

The Robert Bruce placers in Taylor park near Aspen have commenced work. They have three shifts at work and operate without cessation, except to clean up. They can handle from 1000 to 1500 yards of gravel a day. Their ditch, which is over four miles long, is carried over four ditches by flumes which used up 150 M. feet of lumber. It carries 2400 inches of water and at its lower end is 245 feet above the workings. From this point nearly half a mile of pipe, 2½ feet in diameter, carries the water down to a casting shaped like a V into sets of pipes 1½ feet in diameter and several hundred feet in length, and finally in still smaller pipe it arrives at the base of the gravel elevator. The power generated by the water is used to carry the gravel up and deposit it on a piece of trestle work on which there is a flume with the ordinary riffles.

Investor: The year 1898 will see the revival at Aspen of one of the best known silver mines and past dividend payers in Colorado and the development of another, which is almost equally as well known, into a condition of prosperity. The mines are those belonging to the Mollie Gibson and Argentum-Juniata companies, stock in both of which is held in large blocks in Denver and the East. In the past the Mollie Gibson has been an enormous dividend payer and over $4,000,000 was distributed among its stockholders. That was when silver was selling in the neighborhood of $1 an ounce, and when the limits of the famous ore chute were unknown. Silver is worth only about half what it was, while farther down in Mollie ground Mother Earth was so badly rent that the continuation of the ore chute has been lost for years. The Argentum-Juniata has a good record as a silver mine, but has only been a light dividend payer. It came into prominence later than did Mollie Gibson and was always looked upon more in the light of a big commercial enterprise than a bonanza. For many months past both mines have been run at a small profit, but with never enough to warrant the payment of dividends or even to guarantee a large treasury reserve. Within the past ten or twelve months a remarkable change has occurred in the ore bodies in both mines. This was more particularly noticeable in the Mollie Gibson, noted for its very rich bodies of ore in the past, which has developed into a proposition with large bodies of low-grade ore. The grade of the ore decreased also in the Argentum-Juniata, while the size of the bodies increased, but the change was not so pronounced, as the mine had not been previously such a high-grade proposition as the Mollie.

SAN JUAN COUNTY.

The Silver Wing of Silverton has a tunnel 1450 feet and will reach the Tom Moore vein in another 300 feet. Since starting the tunnel two veins of high grade ore have been crosscut, from which a number of tons of ore have been taken. Development is being pushed.——The Good Hope on Bear creek encountered

a body of ore which is a solid streak 33 inches wide that will mill run $300 per ton. The ore is fine-grained petzite and sylvanite.

SAN MIGUEL COUNTY.

The owners of the Butterfly group of mines have completed their mill and the stamps are dropping on ore from their group. The mine has a large ore reserve on hand, blocked and ready for use, besides enough already out to keep the mill going.

The Smuggler-Union tunnel near Telluride is in 1000 feet. In the distance driven and the depth gained they have never found it necessary to use any artificial means for providing fresh air. In an hour after half a dozen shots are fired the smoke has disappeared and pure air fills the tunnel.

NEW MEXICO.

At Elizabethtown three shifts are working on the Klondike sinking at the rate of 10 feet a week. But little water is encountered.——The Black Copper Co. is furnishing employment to twenty-four men.——A 100-foot shaft will be sunk on the Golconda claim immediately.——Cripple Creek capitalists have secured an option on the Challenge mine at Hematite for $65,000.——The Empire mine has 300 tons of ore on the dump. It will be crushed at the Hematite mill.

ARIZONA.

M. Hise is working his Revenue group of mines, Peeples valley, with good results. He has a large amount of ore in sight, and contemplates putting in reducing machinery.

The Wicks & Allison Gold Bonanza, near the Frisnal, continues to produce rich gold ore. The last shipment of less than one and one-half tons gave a profit of over $750 in gold.——A body of ruby silver ore has been struck in the Merrimac mine at Chloride, Mohave county.——The Monte Cristo mine at Groom creek, continues in good ore both gold and silver.——It is claimed that the ore being taken from the Nighthawk mine in Mohave county, runs 1000 ounces in gold to the ton.——The Golden Wonder mine in Tonto Basin, which has produced some of the richest free gold ever taken from a mine in the Territory, is still in very rich ore at a depth of 300 feet.——Some valuable mines are being developed on Pinto creek, near Florence, in gold, copper, silver, iron and lime flux.

The Mohave Co. *Miner* says the Colorado river is at a low stage. The chance for a June rise is not good this year, owing to a scarcity of snow in the mountains of the north.

Coconino *Sun*: That there is gold in the sands of the Colorado river in paying quantities is being demonstrated. The latest placer locations made on the river were near Lee's ferry by a company of Pennsylvania and southern California capitalists. They propose to put in machinery to save the gold, which is fine and hard to save. The company have already spent considerable money in locating and developing their placers. Last week a gasoline launch and row boat were sent out to the river and other bars on the river will be thoroughly prospected.——Springfield, Illinois, capitalists have taken the Star mine in the Bradshaw mountains, near Crowned King, and contemplate putting a mill on the property at an early date.——A 10-foot vein of lead and manganese ore has been struck in the Hardshell mine in Pima county.

MEXICO.

(Special Correspondence).—Guadalupe is an old camp, having been worked in 1848 by an English company whose old books show that $60,000,000 was taken out, the largest part gold. This amount of money was taken out off the top. The deepest shaft is only 160 feet. The present company is the Gerenti-Rosario M. & M. Co.; Sr. Don W. F. McConnel, Supt. and Gen. Mgr. The 10-stamp mill is running on the ore found in the old dumps and averages from three ounces to four ounces gold per ton. The dumps are very rich in streaks, while other parts contain but little. The vein is over 175 feet wide and is visible on the surface for over a mile. It has been worked for one-third of a mile to an average depth of 60 feet. In connection they have a plant of the Mexican Gold Recovery Co., known as the MacArthur-Forrest process, treating over fifty tons per day. The ore is stamped and runs from the batteries direct to the dump, from which it is taken to the tanks. It is treated here for $2.25 per ton over all cost, giving a neat return of $12.75 gold per ton on the average.

Guadalupe y Calvo, Estado de Chihuahua, May 27th, '98.

A correspondent of *Modern Mexico* reports tin deposits in the States of Guanajuato, San Luis Potosi and Sonora. In San Luis Potosi the granite rocks on the summit of the Sierra de la Estanero, in the mining district of Comanja, contain tin ore in abundance. In the State of Durango tin is reported which yields 35 per cent of metal, mostly in the form of oxides.

The Bufer mine, near La Dura, Sonora, is a good producer. A recent shipment of ore went about $400 to the ton and netted $1127.——In Cajon canyon, in the Altar district, the Amarillas mine is a productive property. The ledge is from 4 to 10 feet in width and the ore is free milling gold rock. Eight shafts, varying from 50 to 200 feet in depth, are on the property, with a great deal of other development work, and it is estimated that there are 40,000 tons of high-grade ore ready for stoping.

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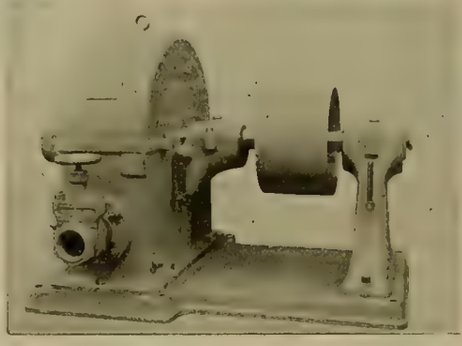
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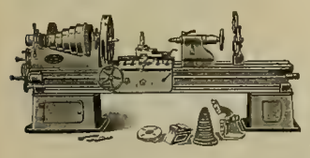
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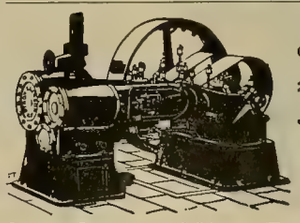
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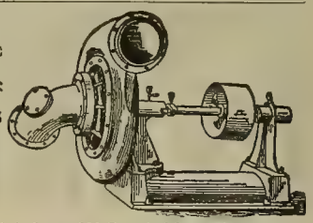
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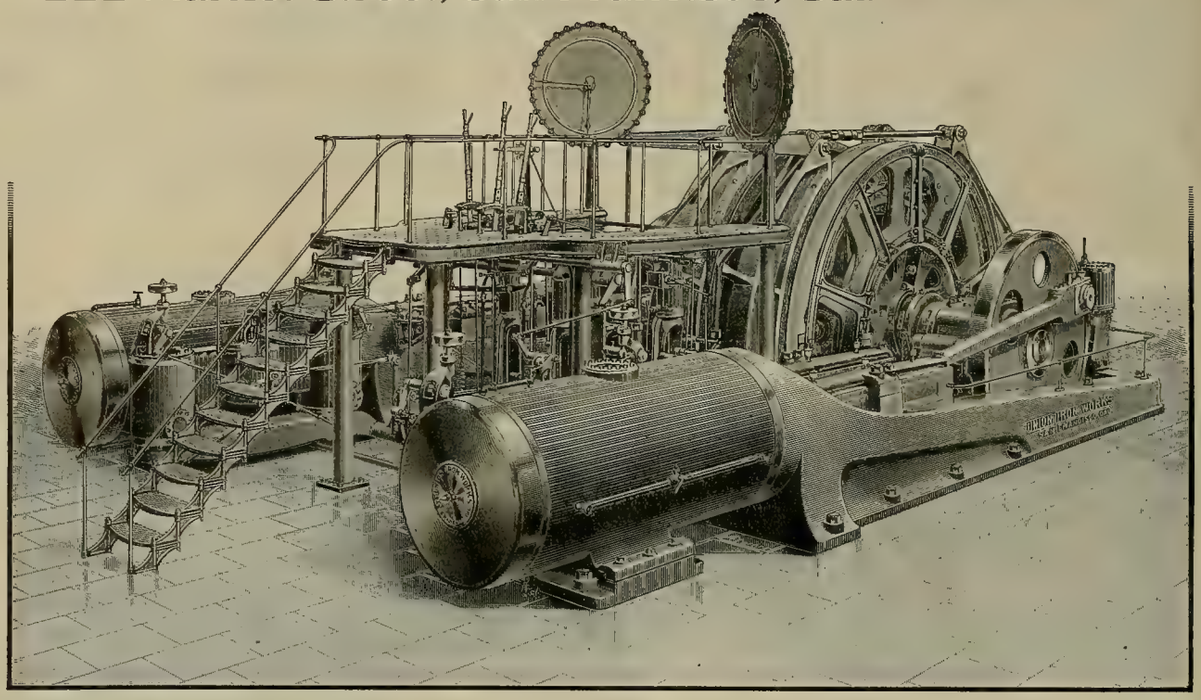
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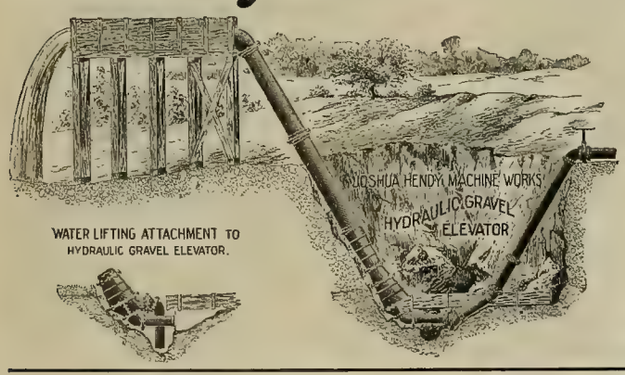
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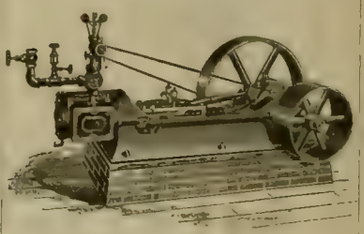
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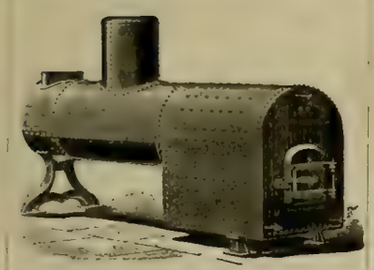
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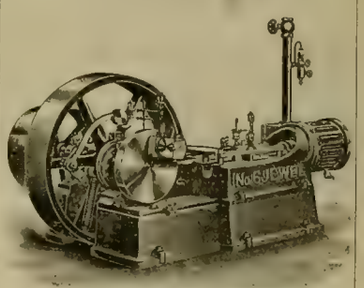


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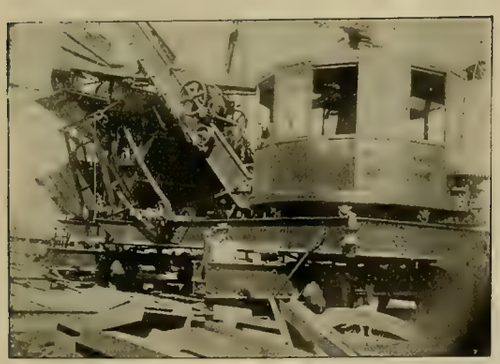
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Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
1...	2500	2 to 4	25 to 150	150 tons	Single operating plant
2...	5000	2 to 3	50 to 300	200 tons	Duplex operating plant
3...	7500	2 to 2½	75 to 450	300 tons	Triplex operating plant

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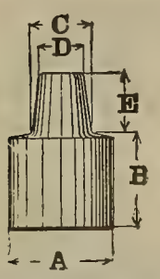
Number.	Capacity in cubic yards of gravel per 24-hour day.	Total operating cost in cents per cubic yard of gravel.	Miners' inches water required where water is scarce or abundant.	Approximate total weight inclusive of power plants.	
4...	2500	2 to 4	Barge	250 tons	Single amalgamator
5...	5000	2 to 3	Barge	325 tons	Duplex amalgamator

In general terms it may be said these plants consist of the electrically operated dredge and amalgamator, mounted either on steel barges for swamp or river-bed mining, or steel-bodied cars for "gulch," "bar" and "hill diggings," together with the necessary power plants for their operation. Several operating plants, either in close proximity or scattered over a large district, may be operated from a single power station, which may be situated at any convenient point within a radius of a few miles, at railroad depot or where water power can be utilized. The river plants, complete in themselves (each barge containing its own power), are made single or duplex; any suitable number of either can be operated on a river, each independently working its allotted section from surface to bedrock, and rim-rock to rim-rock. All these plants are built with a view to easy transportation, in "knock-down" shape over ordinary mountain roads, and, on special order, the size and weight of separate parts may be still further reduced. In the foregoing table the figure representing the smaller quantity of water required applies to cases where, for any reason, it is desirable or necessary to use the water over and over. The water required may be taken from below the placer, thus obviating the necessity of long ditches, etc. Since these plants neatly pile their debris on the cleaned-up bedrock of the ground worked, they may be said to create their own dump, and hence are enabled to successfully operate on flat ground, or where ordinary dumping facilities are lacking. This peculiarity also renders them independent of "debris laws." The wonderful perfection with which these plants extract the finest, microscopic particles, such as are held in suspension in water, or, when dry, ascend in a gentle current of air, constituting in bulk a perfectly impalpable powder (send for samples), renders them particularly valuable and indispensable in cases where, owing to the fineness of the golden particles, very rich mines are unavailable for profitable working by the hydraulic or sluice processes.

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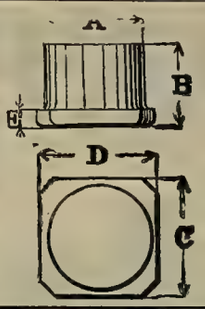
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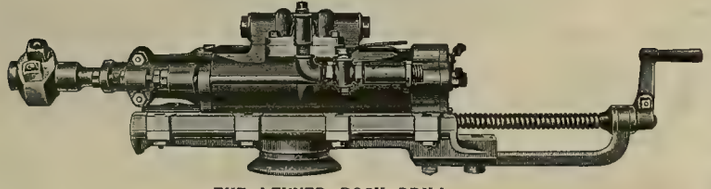
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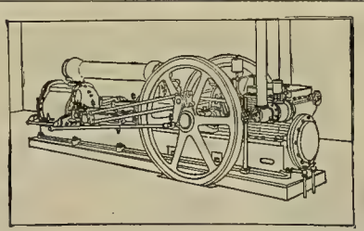
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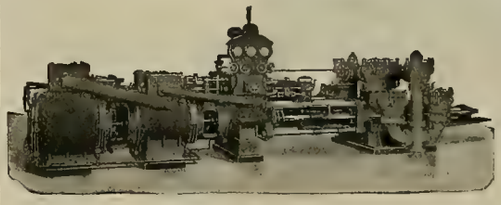
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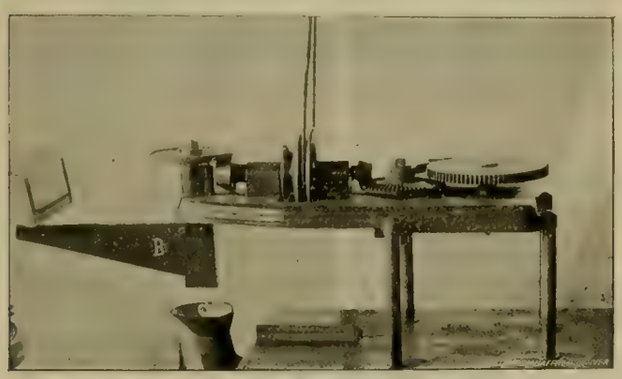
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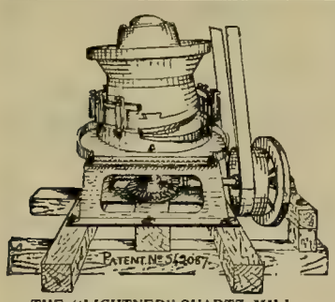
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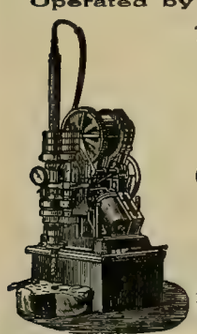
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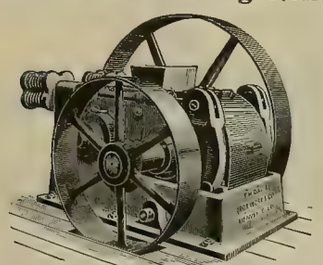
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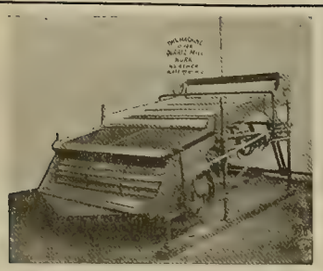
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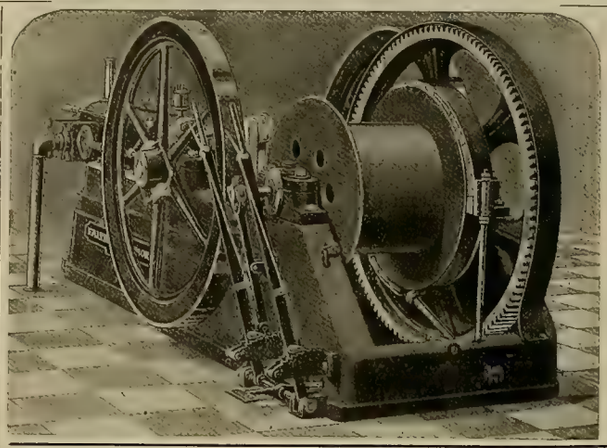


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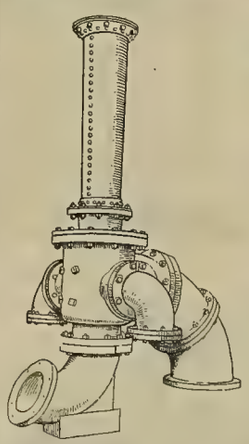
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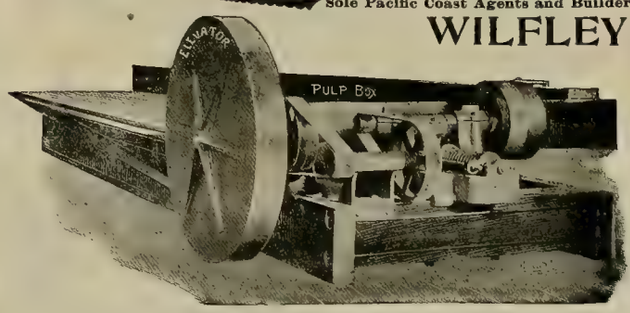
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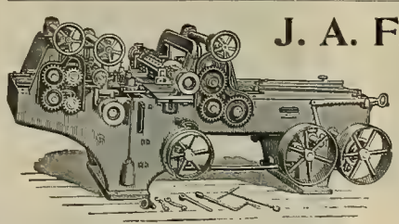
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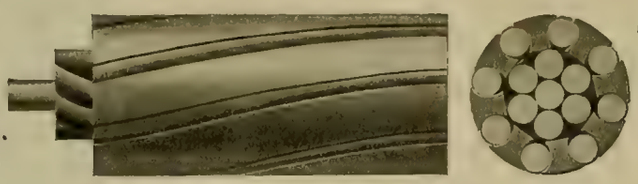
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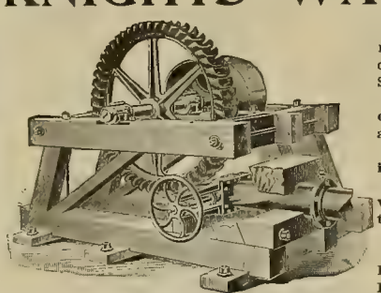


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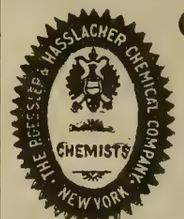


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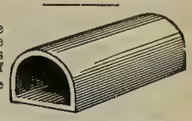
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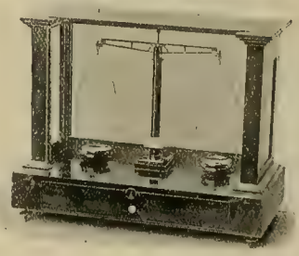
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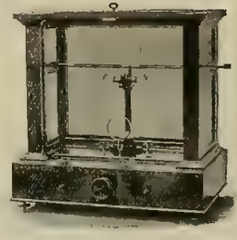
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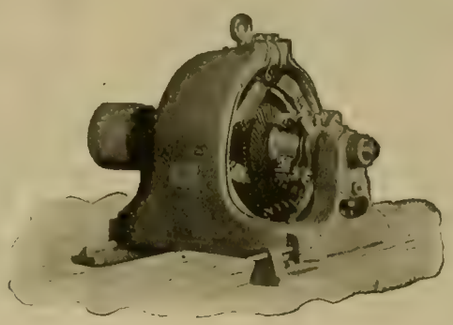
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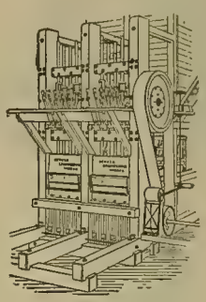
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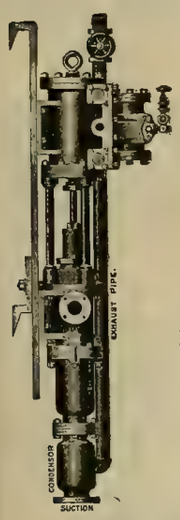
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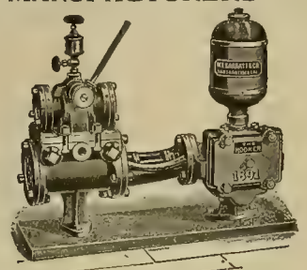
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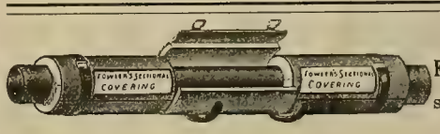


STEEL OR IRON.—We make pipe of either, but recommend STEEL, it being superior to iron in many particulars and inferior in none.
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Engines, Boilers,
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Mill Supplies.

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FOWLER'S
Fossil and Asbestos Sectional Covering,
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
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WHICH FOR STRENGTH AND TRACTION POWER HAS NO EQUAL.



Especially Adapted for
MINING MACHINERY
AND
MAIN DRIVING BELTS.
It Is Unaffected by Water, Heat or Steam.
EVERY BELT GUARANTEED.
Write for Prices. Samples Free.

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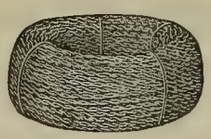
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IT IS A FACT THAT WE ARE THE LARGEST MANUFACTURERS —OF— Electrical Wires IN THE UNITED STATES.

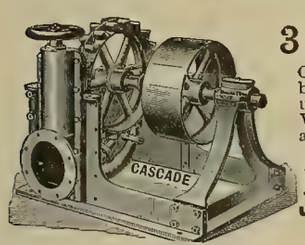


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3 Feet to 2000 Feet.

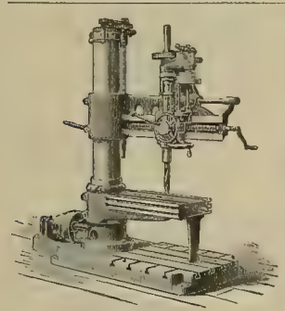


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Send for a Pamphlet of either Wheel and write full particulars.



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PLAIN TABLE MACHINE.

This Drill possesses every means for rapid operations and great results. The back gears are directly on the spindle and are thrown in and out while the Machine is running. The tables are extra long, supported by an outside brace to prevent chatter. The Machine is complete with Automatic Stop, Quick Return, Power Feed, etc.

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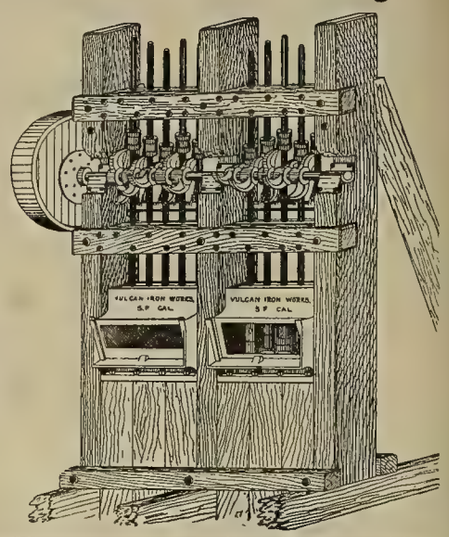
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Of the Latest Improved Design for

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VULCAN WIRE ROPEWAYS

For Conveying Ore, Etc.



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Is superior to shingles or iron, and is especially adapted to mill construction on account of its resistance to

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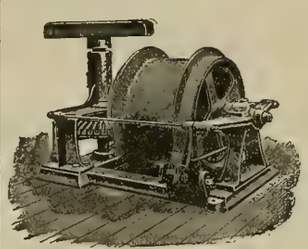
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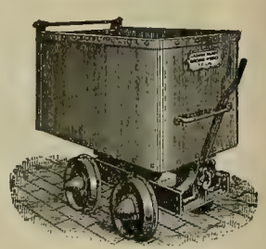
"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of PROSPECTING, MINING and MILLING PLANTS.

ORE and WATER BUCKETS.

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ADAMANTINE SHOES AND DIES

—AND—

CHROME CAST STEEL

Cams, Tappets, Bosses, Roll Shells and Crusher Plates.


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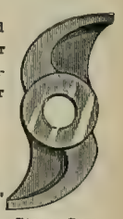

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These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

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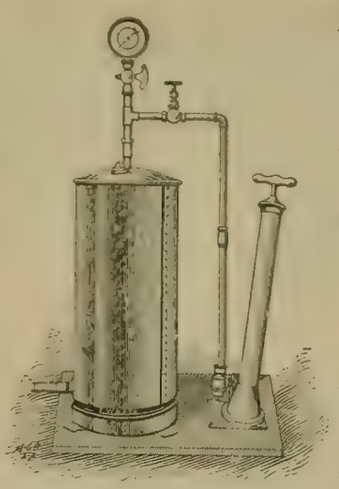
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SMITH-VAILE PUMPS, (For Every Purpose.)
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Costs no more than is asked for inferior Steel, and is guaranteed equal to Jessop's best.



Assayers', Miners' and Chemists' Supplies.

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DIOXIDE SODIUM, ZINC SHAVINGS, BORAX GLASS, C. P. TEST LEAD,
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And everything required by Assayers, Miners and Chemists.

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Self-Oiling, without Oil Cups, Pumps or Tanks. Adjustable and accessible bearings. Renewable bushings for main and rocker arm bearings. Frictionless four-admission slide valve. Oil chamber entirely separated from steam cylinder contact. Rite's inertia governor. Perfect regulation. All sizes. Simple or compound. Belted or direct connection. High, medium or low speed. Designed for every use.



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WRITE TO-DAY and let us make an estimate on your next order for LUMBER, SHINGLES, SHAKES and R. R. TIES. We make a specialty of MINING TIMBER and PLANK for Arizona and Mexico shipment.

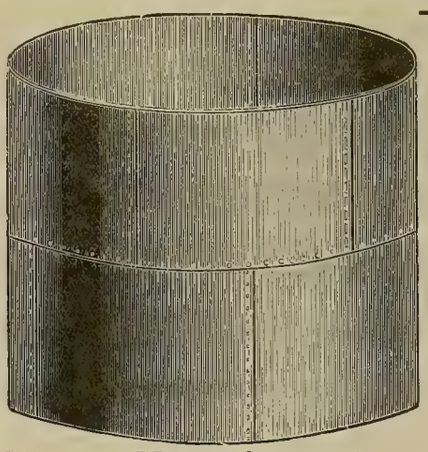
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Water Pipe for Placer, Hydraulic and Quartz Mining A SPECIALTY. Made up complete, or cut, rolled and punched to be riveted at mine.

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MAIL ORDERS PROMPTLY ATTENDED TO. CORRESPONDENCE SOLICITED.

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308-312 REQUENA ST., LOS ANGELES, CAL.

Market Reports.

The Markets.

SAN FRANCISCO, June 16, 1898.

During the week silver receded from its advance of the previous week, due mainly to the stoppage of purchases by the Bank of Spain. In the London bullion market Spanish orders are not executed until the gold to pay for them is put up.

No bullion will be received for coinage at the Mint in this city after to-day until July 5th. During that interval the annual clean-up and settlement of accounts for the fiscal year will take place. A large additional force is now employed on the coinage presses, which are being rushed to accommodate the demand for coin to pay the troops.

Hemp still advances. Manila hemp is the fiber of a species of banana (*Musa textilis*) which thrives only in certain localities, where it is cultivated by the natives. The fiber is still produced in the old native way, by scraping the leaves with a peculiar knife, which requires expert handling. Numberless contrivances to supersede this simple process have been tried and patented, but without success. The native way is still the best, and it produces a fine fiber of which thread is spun and the cloth woven that excels the best Tussore silk. Manila hemp is one of the leading products of the Philippines and it represents one of the most important industries of the islands. The superior qualities of the material are well known to the seafaring men of all nations and to those connected with hempen industries everywhere. It is exported to the United States, Great Britain, Continental Europe, Japan, China and Australia. Forty-one per cent of the export trade is with the United States, the value for the year 1897 being $2,701,651.

The Frankfort Metal Co.'s comparative statistics for '97 indicate that consumption in many cases outran production, and in regard to all metals last year's consumption was in excess of '96. The copper figures show that, while the production last year amounted to 401,000 metric tons, the consumption rose to 410,000. Great Britain still heads the list of consumers, with a total of 105,263 tons, followed by the United States, Germany and France in the order named. The consumption in England, as compared with that of '96, shows an increase of 18¼ per cent, that of the United States 25½ per cent, Germany has nearly doubled, and France has more than quintupled her consumption. At the same time the average price rose from $232.50 in '96 to $245.62½ last year. While the production of tin was limited to 71,092 metric tons, the consumption rose to 75,900. In the consumption of tin the United States takes first place, with a total of 24,000 metric tons, as compared with 15,000 in England and 12,000 in Germany. The average prices for the year were $306.75, as compared with $247.50 for the previous year. Lead was produced last year to the extent of 709,400 metric tons, the largest annual output on record. The world's consumption amounted to 726,000 tons. Lead rose in price from $56.25 in '96 to $62 in '97. The production of spelter, which was equal to 443,000 metric tons, outstripped consumption by some 2000 metric tons; yet the average price in this case—$87.50—is now higher than in any year since 1892. In the spelter department Germany leads the way, with a total consumption of 119,000 metric tons, as compared with 86,000 in England and 77,000 in the United States. The most extraordinary variation of price in the metal tables is that of aluminum, which has fallen since 1855 from $112.50 per pound to 28c per pound.

Iron and Steel quotes the Chicago metal market as follows: Lead is firm at its higher level, though local demand is only moderate. Both consumer and speculator are offering 3.67½c, but 3.70c is asked, and it is reported that comparatively little can be had at that price. Users are buying only in a hand-to-mouth way. Spelter is higher and is now quoted at 4.35c in carload and 4.50 in small lots. Copper is unchanged. Lake, in carload lots, is quoted at 12¼@12½c, and 12⅝c for smaller quantities; casting, 12@12¼c for large and small lots respectively. Antimony is 10¾c for Cookson's and 9¾@10c for Hallett's in small quantities. Tin is stronger at 15¾@16c for limited shipments.

Locally spelter is quoted at $5, tin $15.10, Lake copper $11.80, lead 3.87½.

London quotes silver 26⅞d, New York 58¼c, San Francisco 58⅛c.

Miners' supplies are, in general, unchanged.

Mining Share Market.

SAN FRANCISCO, June 16, 1898.

It did not seem that stocks could go any lower, but whether it was the tax as provided in the war revenue bill or some other bearish cause, in the closing hours of last week's business they drooped lower than ever in price and volume of sales. Never before in the history of the Comstock were shares in that famous lode so low as at present, Con. Cal. & Virginia selling at 35c, a sad contrast to the days when the 540,000 shares of that famous mine were paying a monthly dividend of $2 per share.

At the regular session this morning of the S. F. Stock and Exchange Board the total sales aggregated but 750 shares—700 Gould & Curry at 12c and 50 Sierra Nevada at 58c. The official letter from the latter mine says: During the week we have stoped out from the fourth, fifth and sixth floors forty-two mining carloads of ore. The average car sample assay at the mine was: Gold, $21.55; silver, 8.32 ounces. Hauled to the Nevada mill during the week 73 tons and 1125 pounds of ore, the average battery sample assay of which was: Gold, $26.92; silver, 8.32 ounces per ton. This closes our second run, which consisted of 1285 tons and 1625 pounds of ore, the average battery sample assay of which was $54.61 per ton. Have stopped extracting ore.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage.

Money loaned mines.

Mining companies organized, their property experted, financed and managed.

Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated.

Examine mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

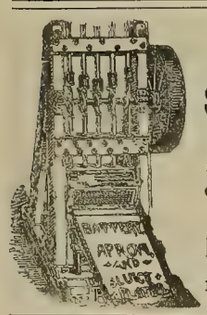
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Marquette, Mich., U. S. A.

Cable Address: EDBEE.
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A B C UNIVERSAL COMMERCIAL.

Working Capital for Mines.

PACIFIC EXPLORATION COMPANY

Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 29-30 Chronicle Building, S. F.



To Gold Miners!

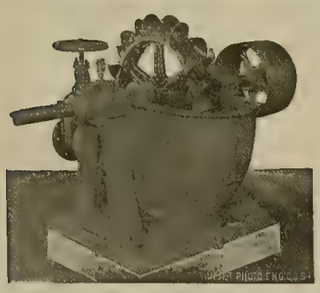
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For Saving Gold in Quartz and Placer Mining.

Every Description of Mining Plates Made.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES REPLATED. TWENTY-SIX MEDALS AWARDED. GOLD, SILVER, NICKEL, COPPER & BRASS PLATING.

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Wheels, Buckets and Nozzles Designed to Suit Special Requirements, When Head and Conditions Are Given.
Theoretically as Well as Practically Perfect.
Highest Efficiency Guaranteed.

We have a Sensitive, Simple Governor that will positively regulate speed of wheel. Specially adapted for electric railway and lighting plants.

Write for Catalogue.

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Yukon Boats and Sleds.

Stern Wheel Boats, 25 ft. to 200 ft. in length. Light draught. Shipped--knocked down--and set up at St. Michael's ready to run. Send for Circulars and Prices.

SAN FRANCISCO LAUNCH CO., - Foot of Stockton Street, - SAN FRANCISCO, CAL.

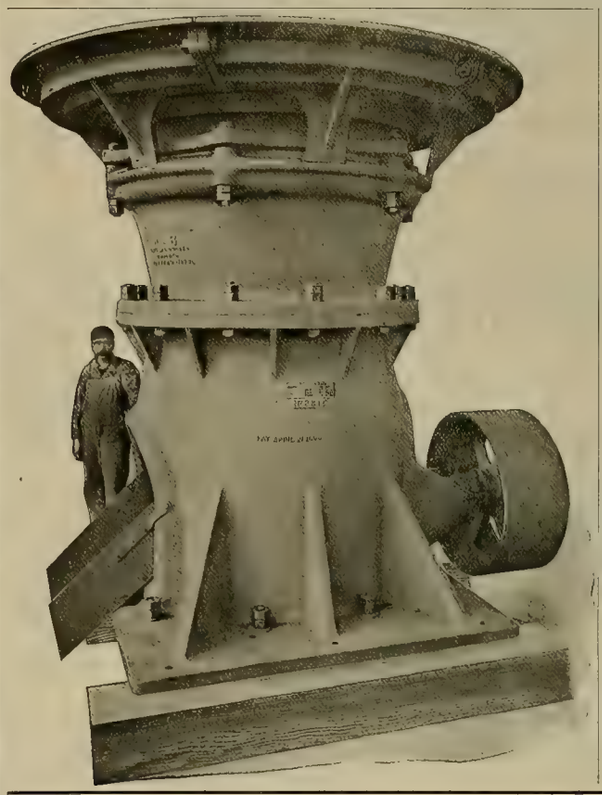
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200 TONS PER HOUR.

Built in Ten Sizes. Capacity 500 Pounds to 200 Tons Per Hour.

SPECIAL FINE CRUSHERS. A New Design for 1898.

We Manufacture High-Grade Mining Machinery. Our Specialties are all as Good as the GATES BREAKER, which is Generally Conceded to be the Winner of all Prizes.

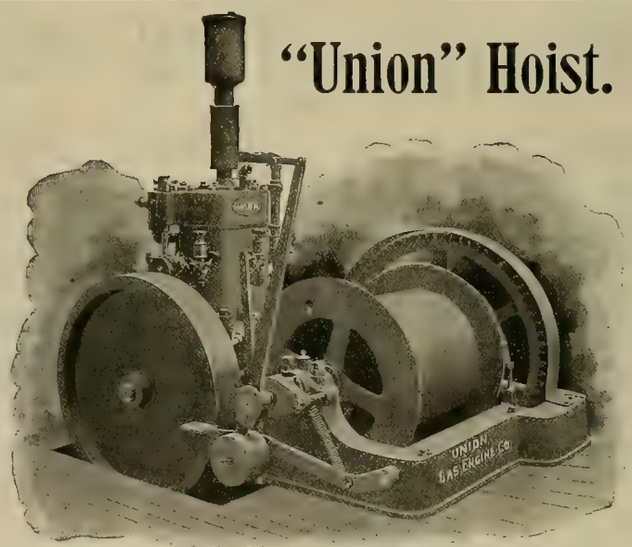


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Agents for Gates Rock and Ore Breaker. Pelton Water Wheel Co., San Francisco. Agents for Tremain Steam Stamp Mill, Henshaw, Bulkley & Co., San Francisco.

"Union" Hoist.



The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
TEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

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WANTED.—Superintending Mining Engineer for Rhodesia, South Africa. Must have thorough technical and practical knowledge of gold mining and milling. Address, with full particulars, "F. B.," Mining and Scientific Press

Position Wanted as

AMALGAMATOR

By a man who has had eighteen years' practical experience. Is willing to go anywhere and is not afraid of work. Can give the best of references. Address "K. L.," care of this office, by mail or telegraph.

FOR SALE.

2 Five-Foot Huntington Mills;
1 Forty-Horse Power Engine;
1 Gates Rock Breaker;
1 Challenge Feeder;
100 Square Feet of Silvered Copper Plates, Shafting, Pulleys and Belting.

All complete and as good as new. For particulars, address D. H. JACKSON, Placerville, Cal.

EXPERT EXAMINATIONS OF ORES

Etc., as to their adaptability to

CYANIDE TREATMENT.

Analyses, Assays, Advice about Methods, Plants, and all Expert Work relating to the subject. Instruction Given.

THE KEITH

Electro-Cyanide Process

Avoids the Labor, Wastes and Expense incident to Zinc Precipitation and to other Electrolytic Methods. Only slight alterations to existing plants necessary to enable the use of this process. Correspondence Solicited.

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ORES! ORES!

Gold, Silver and Lead Ores and Concentrates

PURCHASED AT REDUCED RATES FOR TREATMENT.

SELBY SMELTING & LEAD CO.

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Consign shipments to Vallejo Junction, Cal.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.

CAPITAL, - $550,000.

The Original Cyanide Process.

SIMPLE. RELIABLE. ECONOMICAL.

TRADE MARK.



(MACARTHUR-FORREST PROCESS)

Gold Medal, Columbian Exposition, 1893.

MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by

The MacArthur-Forrest Cyanide Process.

Samples assayed and fully reported upon. Particulars upon application.

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Supported by the State of Michigan. Practical work. Elective system. Special advantages for men of age and experience. For catalogues address

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FOR PROSPECTORS.

A book written by a prospector, giving information on methods and appliances used by frontier miners. By mail, Twenty-five Cents, postpaid. Address "Prospector," Mining and Scientific Press office, 330 Market St., San Francisco.

Assessment Notices.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1898, an assessment (No. 19) of three cents (3c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 106 Leidsdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of July, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 3d day of August, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidsdorff street, San Francisco, Cal.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 916 Market street, Room 57, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of June, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 23rd day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—No. 916 Market street, Room 57, San Francisco, California.

LEON GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Winchester, Riverside County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 1) of 1½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Room 7, fifth floor, Mills building, San Francisco, California.

CONS. ST. GOTHARD GOLD MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of June, 1898, an assessment (No. 14) of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 113 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of July, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 10th day of August, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. F. HOLLING, Secretary.

Office—113 Crocker building, San Francisco, Cal.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 10th day of June, 1898, an assessment (No. 10) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of July, 1898, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 8th day of August, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Red Cap District, Humboldt County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 27th day of April, 1893, the several amounts set opposite the names of the respective shareholders, as follows:

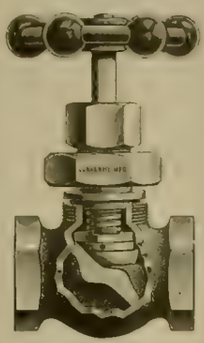
Name.	No. Cert.	No. Shares.	Amt.
Harvey M. Binckley	2	1	2 00
Alice E. Binckley	20	4	8 00
Alice E. Binckley	23	20	40 00
Alice E. Binckley	24	20	40 00
Alice E. Binckley	25	20	40 00
Alice E. Binckley	26	20	40 00
Alice E. Binckley	39	1	2 00
Alice E. Binckley	40	2	4 00
Caroline S. Townsend	18	20	40 00

And in accordance with law, and an order from the Board of Directors, made on the 27th day of April, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 125 Beale St., San Francisco, California, on MONDAY, the 27th day of June, 1898, at the hour of 3 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

Office—125 Beale St., San Francisco, California.

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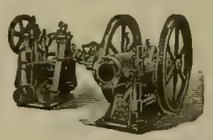
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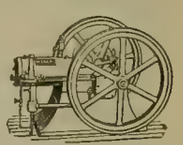
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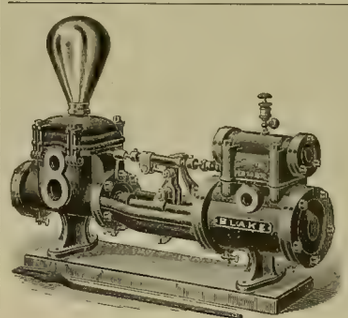


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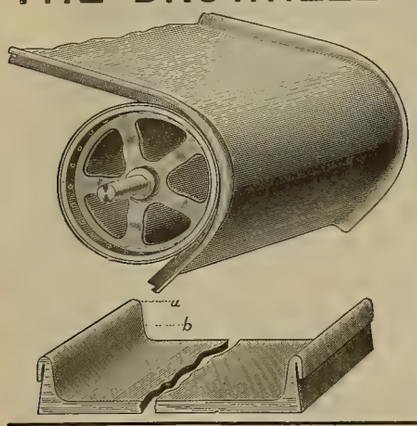
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GRASS VALLEY, NEVADA CO., CAL., Feb. 20, 1897.

JAS. S. BROWNELL, ESQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

ROANOKE MINING COMPANY,
MOKELUMNE HILL, March 4, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: We have in our 20-stamp mill at this place five Frue vanners; three of these are equipped with the Patent Lip flange belt and two with the plain flange belt. We certainly consider the former a great improvement on the latter. They will certainly wear much longer, as cracking now seems out of the question. Any one purchasing the Frue vanning machine should see that it is equipped with the Patent Lip flange belt. Very truly yours, ROANOKE MINING COMPANY.
Per G. M. WILDE, Acting Superintendent.

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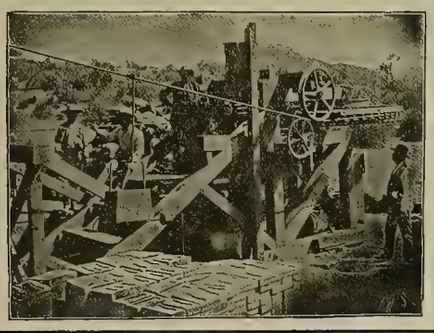
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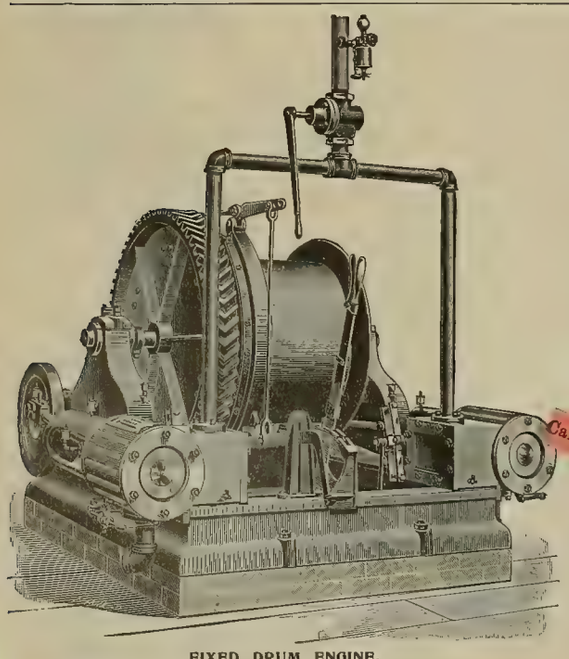
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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 1981.—VOLUME LXXVI. Number 26. SAN FRANCISCO, SATURDAY, JUNE 25, 1898. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Bituminous Rock Deposits in the Vicinity of San Luis Obispo, Cal.

Written for the MINING AND SCIENTIFIC PRESS by HAROLD W. FAIRBANKS, Ph. D.

Numerous isolated descriptions have appeared of the bituminous rock deposits of California, but the geological conditions governing their occurrence, strange to say, have been almost entirely overlooked, and in the following article an attempt will be made to explain their genesis and the conditions under which they occur.

The term "bituminous rock" is commonly applied to a sandstone which has been impregnated with a thick oil or tar. In the fresh condition it forms a black and more or less plastic mass quite tough and tenacious, but on being exposed to the air for a long time it dries out and assumes a brownish color. The designation asphaltum is applied to the solid or viscous residue left upon the evaporation of the volatile constituents of a heavy oil. This may be found nearly pure where it has collected about the orifices of springs or in veins mixed with more or less sand and clay.

Bituminous sandstones are scattered at various points through the Coast Ranges, mostly in the countries of Santa Barbara, San Luis Obispo and Santa Cruz. Ventura is probably the most important oil producing county, yet the conditions here have not favored the formation of bituminous rock, although there are large deposits of asphaltum. The oil of this latter region has a smaller percentage of an asphaltum base than that of the coast counties farther north.

The important deposits of San Luis Obispo county which may be taken as a good example of the occurrence of this material are found along the line of low hills lying south of the town of San Luis Obispo between it and the ocean. The origin of the bitumen is clearly shown in this region and will be briefly explained.



BITUMINOUS ROCK BLUFFS, SOUTH OF EDNA, SAN LUIS OBISPO CO., CAL.

With some unimportant exception the deposits of oil and tar or bitumen in California are associated with rocks of Eocene, Miocene, and Pliocene age, and of these the most important in this respect is the Miocene. Those who have made a special study of petroleum are at the present time almost universally agreed that it is of organic origin. They believe that all facts point to its having been formed during the destructive distillation of animal remains buried in the rocks during their period of formation. These conclusions are supported in the most unequivocal manner by the conditions under which oil and its related products occur in California. The group of rocks forming the Miocene in the Coast Ranges is practically characterized by a great thickness of silicious or flinty shales with some of calcareous origin which in their unaltered condition appear to be made up almost wholly of the remains of microscopic sea animals, such as diatoms, radiolaria, and foraminifera together with broken fish skeletons. Over nearly the whole of the area occupied by these rocks in the Coast Ranges for a distance of 400 miles in a northwest and southeast direction there are indications of oil. In all sections where the organic shales are absent no oil is to be found thus indicating clearly its connection with them.

The product distilled from the shales varies greatly at different points. There can be no doubt that much of it has passed away as gas. In some places the conditions have favored its preservation as a light volatile oil with no solid base, in others the product remaining at the present time is a thick dark oil with a very large percentage of asphaltum. It is the latter oil which, after passing upward from the horizon in which it was generated, has impregnated the overlying soft loose sandstones, giving rise to the bituminous rock. It thus appears that in addition to the presence of the organic shales a proper reservoir is necessary for the preservation of the bituminous products. The shales giving rise to the oil are compact and fine grained, and if there are no strata of porous nature to intercept the distillates they will be lost or so disseminated through the narrow fissures of the rock as to be of no value commercially. It happens, fortunately, that in Ventura county associated with the shales, as a part of the same formation, there are thick beds of sandstone, and it is from these that the oil is obtained. In northern Santa Barbara and San Luis Obispo counties a different condition exists. The Miocene is formed almost wholly of shale which offers no reservoir and the larger part of the formation now appears barren of oil. At various places, however, the shales are overlaid by younger formations which do offer excellent conditions for the preservation of the oil. It is chiefly in these overlying rocks that we find the extensive and valuable deposits. Chemical action is going on in the deeply buried shales as shown by the warm and cold sulphur springs which are quite numerous, and from the fact that the oil or tar is very generally associated with these springs leads to the conclusion that it is still being generated and that the gas and flowing water forces it upward. If at the points where the tar issues from the shales there are no overlying rocks it forms a surface accumulation, but if it is overlain by sandstone it gradually percolates through the latter and in the course of ages has formed the extensive masses of bituminous rock. Large areas of the latter must have been eroded since formed, but at present there is probably all that can ever be used.

The Buchon range, southwest of the town of San Luis Obispo, is composed of Miocene shales sharply folded. Toward the southeast the shales sink and are covered by a younger formation largely composed of soft sandstone. This stretches from a point a little west of the railroad running to Port Harford southeast to Arroyo Grande, the strata being folded together in the form of an open trough. For about half the distance, beginning on Marie's ranch on the northwest, and extending to a point about two miles south of Edna, the sandstones are more or less impregnated with bitumen, especially along the outer edges of the fold. In places the process of impregnation is still slowly going on. It would be useless to try to mention all the localities along this belt where valuable material is found. Along the coast between Pismo and Port Harford are excellent exposures of the bituminized sand overlying the Miocene shales. The presence of the bitumen makes the sand much more resistent to the forces of erosion and its presence is often indicated by the weathering out of bold rocky cliffs. Many of the localities of this rock are favorably situated for working, but have not yet been prospected.

South of Edna the distinctive features of the bituminous rock formation are illustrated on a grand scale. Here areas of the rock form great bluffs rising almost 400 feet above the valley. These bluffs are shown in the accompanying engraving. Many quarries have been worked in this section in past years, but owing to certain combinations among the companies operating in the State this field has been almost abandoned for some time. One has only to make a curosory examination of this region to be impressed with the magnitude of the deposits. The sand and bitumen are already mixed by nature, forming a paying material which can be rarely equalled by that artificially prepared and which ought to be mined so cheaply as to cause its general adoption.

The question as to the presence of oil here in quantities sufficient to be commercially valuable has interested many, but the indications do not seem to have been considered sufficiently favorable to induce thorough prospecting. Two wells were put down some time since but without important results. One encountered a large flow of warm sulphur water at at a depth of about 900 feet and the locality is known as the Sycamore Warm Sulphur Springs.

The question in this region which still remains to be solved is whether oil is sufficiently thin to be pumped will be met with in drilling. There is no doubt that in the proper localities thick tar would be encountered, a tar similar to that flowing from the springs scattered over the region. It may be that the oils with a smaller percentage of permanent base do not exist here. They may never have existed or for some reason or another the volatile portions may have been expelled. The question can only be settled by prospecting.

THE lifeless condition of the mining stock business is, if possible, further deadened by the war bill which became effective on the 14th inst., by which the stock-broker is required to pay 2 cents on the transfer of every lot of stock of the "face" value of $100, and an additional 2 cents for registering it, which practically prohibits "transfer" of low priced stocks. Any stock board report illustrates this. Take, for instance, the San Francisco Stock Board, "1000 Alta, 4 cents." The "face" value of that block of stock at $100 per share would be $100,000; under the law the tax on that one transaction, if actual transfer took place, would be $20. Where, as in the case of industrials, the market and "face" values approximate, the new tax falls lightly, but unless a less rigid interpretation is put upon the law it will "knock out" the business of Board mining stocks so far as actual transfers are concerned.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent.

Office, No. 330 Market Street, San Francisco, Cal.
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J. F. HALLORAN.....Publisher

San Francisco, June 25, 1898.

TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

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MR. SYMINGTON'S remarks on suggested concentration of cinnabar ores on page 664 are to the point. As in many gold quartz properties in the State, present paying mines were abandoned or worked at a loss. It is not so much the mine as the manner of management. In the Ætna, for instance, the last report shows a profit for '97 of $52,685 on ore that produced 0.78 per cent quicksilver. The report shows a cost of $4.47 per ton, of which probably $4 was for mining and prospecting.

THE second session of the International Mining Congress to be held in Salt Lake City, Utah, July 6th, 7th, 8th and 9th, gives promise of being attended by more than 1000 delegates and of possessing great interest to the mining industry. The purpose and policy of the Congress has been repeatedly referred to and is commendably progressive. Pacific coast delegates have a single fare rate for the round trip over the Southern Pacific, and the same plus $2 over the Oregon Short Line.

A MEASURE of tardy justice is the Congressional bill passed June 6, calling for the revision and classification of letters patent. The national patent office has long been behind with its work, and although its receipts so exceed its expenses that there is a constantly increasing surplus, yet there has been a chronic congestion of work. By this bill (which it is estimated will entail an expense of $300,000) the Commissioner of Patents can increase the number of examiners, revise and perfect classification, and greatly expedite the work of passing upon applications for patents, an improvement that will be appreciated by inventors and others who have business with that Government institution.

IN last week's issue, in editorial reference to the colossal scheme of the West Australian Government to lay 328 miles of water pipe, mention was made of "pipe made of steel spiral embedded in concrete." Inquiry for details regarding that class of pipe is made. The pipe is manufactured in England, and, also, in New York city. In the latter city the sheet steel after being cut into strips of a width varying with the required diameter of the pipe, is riveted or welded into a continuous strip of the required length. This strip is then fed automatically into the pipe-making machine, and during its passage through it the rivet holes are punched, the laps of the edge of the strips are brought together under pressure, and held during the process of riveting. The rivets are all set by compression. The edge is slightly recessed, throwing the lap on the outside, so that the inside diameter of the pipe is maintained evenly throughout the entire length. In order to render the pipe water-tight when it leaves the machine, special hydraulic cement is inserted between the laps before riveting.

Change in Mining Laws.

Among other important subjects of general interest to be discussed at the coming convention in Salt Lake City are the proposed changes in Federal mining laws. Nothing is of greater importance to the mining world. As usual, Senator Stewart of Nevada opposes any change; he says it would "retard the development of the mineral country and tend to place valuable mineral land in the hands of monopolies."

To any one acquainted with the facts, Senator Stewart's mention of monopolies is ludicrous. With the exception of a recently extinguished Senator from Oregon, no man has been credited with being more useful to "monopolies" at the national capital.

The proposed change would have precisely the opposite effect from that asserted by the Nevada Senator—merely asserted, but not discussed. As at present, a miner has often to come close to perjury to protect himself by securing a patent for his mining claim, because he may not have found "mineral in place" thereon, though it is evident that mineral does exist there in paying quantities and he be willing to spend thousands of dollars on development work demonstrating the fact. In Colorado, Cripple Creek and Leadville are substantial proofs of this statement; in California as evident facts can be cited. One of the proposed changes is an amendment to Section 2335, R. S., to contain a clause reading:

That in investigating the character of the land, with a view to ascertaining whether it is more valuable for mineral than for agricultural purposes, evidence may be taken of the mineral discovered or developed adjacent to such land, proof of which shall be presumptive evidence that the land in question is and always has been mineral in character.

This applies to a variety of necessary cases, among others the drift mines, the deep gravel mining claims of California. There are in this State hundreds of miles of lava-capped divides, or ridges, in which are buried channels of ancient rivers, filled with gold-bearing gravel; the surface gives no evidence of the gold beneath. As at present, the miner must sink shafts hundreds of feet deep on each twenty acres to show what any miner already knows, that there is an auriferous channel. To get at it the less expensive and usually the only profitable way is to tunnel under the lava cap, but he may spend thousands of dollars doing that, and as he finally does reach the paying drift between the rim rock some thrifty "agriculturist" comes in just ahead of him and gets prior title at an expense of $1.25 per acre, while the channel may go from $50 to $500 per running foot in gold.

In Placer Co., Cal., on the Forest Hill divide, is a case in point, a lava-capped ridge overlying an ancient river channel; over $30,000,000 in gold have been extracted, the ground paying from $75 to $1000 per running foot. This channel is covered from 500 to 1000 feet by a cap of cement or lava, and on the surface gives no indication of being mineral land; grass, flowers and trees do not hint at the buried treasure which is reached by horizontal drifts and tunnels. On one, the Hidden Treasure, in the region mentioned, the tunnel thus opening the deposit was 900 feet long. That mine has produced over $1,500,000; $1.75 per ton of gravel. The Mayflower drift mine paid $7 per ton of gravel; there were 12,000 feet of drifts. Conservative mining experts calculate that there still remain in that one California county 200 miles of unworked auriferous gravel channels, which would yield from $500,000 to $3,000,000 per mile. The work of opening up these buried deposits is costly enough without the ever-threatening expense of contest regarding the "agricultural" character of the land, under the law as at present framed.

It is to be noted that the proposed amendment above quoted does not designate such land as mineral as may have adjacent to it discovered or developed mineral deposits, but merely that evidence may be taken that there is such mineral adjacent. If this be proven, it is then to be taken as presumptive evidence that the land in question is mineral in character. There is nothing unfair in this to the agricultural claimant; it merely gives the miner "a fair show;" he must still prove that there is discovered mineral adjacent to his claim, but he would not be menaced from start to finish in his costly work by the probability of a contest at the close, made certain if his calculations proved true and he were to unearth a valuable find.

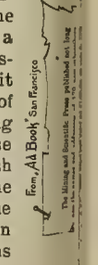
Pages might be filled citing such instances in every mining State and Territory, but on the one side is the Nevada Senator and on the other the Western federation of miners, each agreeing that "the present laws are good enough," "we want no change," diametrically opposed on every other question, but singularly a unit on this.

There are many changes necessary in our mining laws, and precedent, tradition, corporate interests or ignorance should not be allowed to block the way.

National Mining Legislation.

There are several matters of general interest to mining men before Congress for present consideration. War measures and Hawaiian annexation overshadow nearly all other legislation, and it is doubtful if the two houses will take concurrent action on any of the matters referred to before final adjournment. In the House of Representatives a bill has been introduced to compel every mining claim owner to work out his assessment under penalty of forfeiture, to allow no man to hold more than one lode or placer claim at one time, and to reduce the size of lode claims to 300x750 feet. This ridiculous measure will not be likely to receive serious consideration from any one but its originator. The proposition to generally suspend for the calendar year the requirement for assessment work will probably get no further than the committee room, which is as far as it deserves to get. The Committee on Public Lands has instructed Congressman Shafroth of Colorado to favorably report, with amendments, the bill allowing miners who have enlisted in the army or navy of the United States to retain title to their claims during continuance of the war. The bill is amended by the addition of two provisions embraced in a similar measure recently introduced by Bell of Colorado as follows: "Those desiring to take advantage of this act shall file a notice in the clerk's office where the location certificate of said mine is recorded before the expiration of the assessment year, giving notice of his enlistment and notice of his desire to hold said claim under this act. If any such enlisted soldier or sailor has a co-owner or owners in any mining claim and who are not in the army or navy, and such co-owner or owners fail to do such a proportion of $100 worth of work per annum as the interest of such non-enlisted person or persons bears to the whole claim, then such interest shall be open to relocation by any other qualified person or persons, or by their doing the necessary work thereon and filing an affidavit of labor showing the forfeiture and that the relocators had done the annual work required of such non-enlisted persons, and succeeded them in right under this act, which work may be done at any time after the expiration of the assessment year and before owners resume work thereon. The work and affidavit aforesaid shall operate as a transfer of said forfeited interest from the former owners to said relocators." As amended this bill has possibility of passage, taking the place of the bill previously referred to, which had already passed the Senate.

SOME TIME AGO mention was made of the receipt in twenty-six consecutive working days of one month of the names of 179 new subscribers to this paper, illustrative of its growth and popularity, and the name and address of each of the 179 was published. Subsequently some of them wrote saying that they had received inquiry so far as they were individually concerned; and others wrote saying that since the appearance of their names they were inundated by a flood of contemporaneous literature, which illustrates another phase of the business. Meanwhile it is not the intention to further publish the names of the hundreds of new subscribers constantly being sent in by our traveling agents, in addition to those sent to the office direct. Since Jan. 1st, '98, each agent states on his daily subscription report the occupation of each new subscriber. With this issue closes the 76th volume. Reference to the index on pages 687 and 688 will indicate one of the reasons why the paper is so widely read. Three times during the last year the News Co. has increased the regular order for weekly delivery. It is believed that nowhere else for so small a cost could 688 pages of up-to-date information in this field be secured. The volume closing with this issue is the largest of any similar six months in the thirty-eight busy years of the paper's history.



Mine Reserves.

Several papers have been discussing the propriety of establishing a sinking or reserve fund by every producing mine, and instead of exhausting its resources by periods of dividend and periods of debt-making during its development, to place the first earned surplus in the treasury until a reasonable amount is on hand, and maintain that amount during the life of the company. The idea is worth consideration.

Probably some miners, promoters or stock brokers have not given much thought to the value or necessity of an ore or cash reserve to successful mining operations; it is an important and essential factor in the problem of success or failure. A reserve fund, of ore in the ground or cash in the treasury, is a protection against unexpected contingencies, such as a pinch in the ore body, accident to mine or machinery, caves, overflows, and many other demands upon the resources of the property.

In mines operated under prudent management a reserve fund is usually considered a necessity, evidence of sound judgment and honest intention. In too many instances, however, an honest but ill-advised effort is made to encourage those who by contributing their money have made success possible, and a premature dividend is declared, an injudicious improvement is made or the mine robbed of all its ore for current expenses or to give a shipment record. In either case the result is as bad as that brought about by the vicious manipulator who has encouraged showy improvements or premature dividends, hoping to create a boom during which he will unload his interests on the inexperienced at a big figure that will give him a large profit, and put him in shape to work another scheme of the same character.

Nearly every prominent mining camp in the Rocky mountains has such repeated history in the story of good properties having pay ore in their depths, but now lying idle, improvements going to ruin and the property resting under the ban of public condemnation because unwise management or foolish expenditure has exhausted the visible resources, the ore reserve, and left nothing with which to continue development or open up new ground. With an ore reserve blocked out in the mine, or a cash reserve in the treasury, as provided for in the manner suggested, such conditions could not exist. In some quarters the present tendency is toward manipulation and against honest development, to such an extent that he who is honest in all other matters will applaud himself for a bit of successful work in a mining deal.

Justice to the miner, to the stockholder, be his interests large or small, and, above all, to the good name of mining generally, calls for remedy in line with wisdom and good policy, and for the interest of every honest operator. Skill and ability, backed by good ore, can avail nothing against extravagance that would exhaust the reserve fund in premature shipments, dividends or showy improvements.

Men who have given the subject consideration go so far as to suggest the enactment of law, and claim that by unity of effort a statute could be secured, with penalty for its violation, requiring the value of the first output and a stated percentage of all subsequent outputs, less actual working expense account, to be retained as a reserve fund in the treasury until a sufficient amount be accumulated to meet regular expenses, such as a three-months payroll for the force employed, and necessary development, increased power, enlargement of plant, or opening up new ground, and forbidding the use of such reserve fund so long as skillful and economic working can output new ore to meet running expenses of labor and development—that is, forbid the payment of dividends from this reserve fund, or any other fund, until the earned surplus is in excess of the fund and current expenses: this to block the game of the manipulator who seeks private gain at the risk of the mine's exhaustion. Whether such a law could be secured, or, if enacted, could be made operative, is a very doubtful question. That such a law would convert many prospects into mines, and bring to life hundreds of good mines that are now lying quiet and valueless under the blight of seeming exhaustion forced upon them by the crime or folly of a management that worked on the policy of "leaving nothing in sight," is possible.

The fool's maxim is "a short life and a merry one," and if, as in his case, he alone would suffer, there would not be one to raise a voice of warning or object to his folly. But folly does not end where it begins—the merry life of one is at the expense of hundreds of hard working, worthy prospectors and people of limited means, who see weeks of hard effort pass away in one hour of extravagance; it is at the expense of the good name of an industry that should be classed among the most legitimate and not, as so often now, among speculations with a large percentage of risk, even in many promising and inviting propositions. This evil might be cured by united and earnest effort.

There is no falling off in the inquiry and demand for good mining properties, which shows that capital, as a rule, seeks this class of investment. But it is equally true that this same capital is much more cautious, sensitive and rigid in its methods of inquiry and investigation, and harder to satisfy, than it was ten years ago, and this unfavorable condition has been brought about, principally, through caution induced by the knowledge of so many properties now lying idle that at one time had a good reputation and can show shipping records. One such property in a camp, although surrounded by good producers, does more injury to the camp in the eyes of capital than can be overcome by a dozen working, paying mines.

The argument will always be, if a property is in pay, it can maintain a reserve fund, and if it cannot maintain a reserve fund, it cannot be in pay. This rule will not apply to a prospect, but it is usually safe to apply to a property that is classed as a mine. The reserve fund is the best guaranty the investor can have that his investment is in good hands, and that he has a show to receive interest on his investment.

The Building Stones of California.

There is scarcely one of California's mineral resources concerning which there is so little definite and systematic knowledge available as its building and ornamental stones. To show the truth of this statement it is only necessary to call to mind the difficulty experienced in selecting the stone for any of the large buildings recently constructed or in contemplation in the city of San Francisco. For years it has been supposed that suitable stone of many kinds, especially the finer grades, together with ornamental stones, did not exist upon the Pacific coast, and the larger part that has been used has been shipped from the East.

There is some reason for this in a new State where labor has been high and many portions somewhat inaccessible, but there is no reason why, with our present state of development and the era of more substantial and expensive buildings upon which the larger cities have entered, we should continue to be in ignorance of the home resources upon which the construction of such buildings largely depends. It seems unfortunate, when bids are made for furnishing stone, that the best and most desirable home material is liable to be rejected in favor of the imported, simply because we have neglected to acquire detailed and reliable information as to the extent and character of the quarries, as to what they are capable of furnishing. At the present time there is almost no information concerning the variety and quality of stone contained within the boundaries of the State. We know that the common granites, marbles and sandstones exist, but in the building up of a great city more is needed. We must have these rocks in variety, ornamental as well as plain stones, must know their accessibility, and have upon record accurate observations upon their physical properties. A large amount of geological work has been done in the State but it has never been directed specifically to the examination of building stones, and, although we know there is a great variety of them, yet this knowledge is not full or accurate enough to be practically valuable.

A thoroughly scientific, as well as practical, investigation of this subject is perhaps more urgently needed here than in many other regions because of the extremely complex geological conditions. The Coast Ranges in particular have been subjected to so many disturbances that many of the rocks which would otherwise be of value are so dislocated and fissured that large blocks cannot be obtained. The study of the circumstances conditioning the presence of building stones is purely a geological one and requires trained geologists if reliable results are desired. The geological conditions are, in some respects, similar to those of coal. In many places in the Coast Ranges the real character of coal seams, which have given every appearance upon the surface to the eye of the uncritical observer and upon the development of which much money had been uselessly spent, could have been shown up if the proper geological investigations had been carried out.

Many things condition the value of a stone for building purposes. In a crystalline rock it may be the degree of resistency offered to disintegration by the different components, or the presence or absence of those substances which easily oxidize and give discoloration. These questions are best solved by careful observation of the surfaces of the rock produced by nature during long exposure to atmospheric action. We may be sure that if iron stains develop upon the surface of the rock in its natural condition, or the corners and angles easily crumble away, a piece of this rock, though it may give the finest appearance when freshly cut, will eventually assume the same appearance as the weathered portion in its natural condition.

The age of a crystalline rock does not necessarily affect its value for building purposes. The value of sedimentary rocks which are used for building purposes is on the contrary largely determined by their age. The older sedimentary rocks present a much more thorough consolidation, a more complete cementation of the grains than the more recent rocks. In California the youngest sandstones of much use for building purposes are of Miocene age. They are, however, generally rather soft, and do not weather as well or stand the pressure that older rocks do. The Eocene and Chico formations contain the most of the sandstone which is available for buildings of large size. In many places they are capable of furnishing stone of excellent quality. The sandstone found upon the Sespe in Ventura county is probably the best in the State. In addition to an excellent quality there is an almost endless variety of color.

Some sandstones harden on exposure to the air while in others the material cementing the grains is more readily soluble in atmospheric waters and is finally carried away. Any rock which weathers out in large massive fragments the angles of which remain fairly sharp can be depended upon as far as durability is concerned, and it is in regard to this very quality that the most trouble with sandstones is encountered. The oldest sandstones of the Coast Ranges are of Jurassic age and though they are very extensive they offer few places where large blocks can be obtained. This is due to the disturbances which the older rocks have experienced and as a result of which they have been cracked and seamed.

It is thus seen that a thorough description of building stones demands not only a laboratory examination but also one of the conditions which they exhibit in the field. The neglect of this important consideration has led to the use of stone in many buildings which began to crumble almost as soon as they were finished.

There can be no doubt of the great benefit to the state in general and the building industry in particular if there was at hand thorough and reliable descriptions of the quarries already opened, as well as the possibilities for opening others in new regions. The geological reconnoisances which have already been carried on have brought to light many occurrences of valuable stone, but not enough is known as yet to make the exploiting work of much value.

California is a large State and contains a richer variety of stone than has generally been supposed, but as affairs are at present the production of stone is far behind what it should be. If a thorough and practical subject of the study were made, and the detailed report illustrated by specimens, a great change would certainly take place and California would come to occupy the position it ought to, considering its great natural resources in stone.

THE MINING AND SCIENTIFIC PRESS is always glad to receive and publish communications of interest in mining and metallurgy. Interchange of opinion and experience is of general value to the mining industry, and mining men everywhere are invited to consider these columns an open forum for discussion and information upon cognate topics.

Economy of Electrical Transmission.

A notable instance of economy in electric traction is afforded by the installation recently made by the General Electric Company for the Arlington Mills, Lawrence, Mass. These mills have about two miles of track running from the main line of the Boston & Maine Railroad into the yards and throwing off spurs into the alleys between the different buildings. Previous to the change to electrical service, the haulage of the entire output of the mills to the main line, the haulage of the material from building to building, as well as the necessary switching about the yards, was done by a steam locomotive rented from the railroad. For this service the Arlington Mills paid an annual rental of several thousand dollars, and were, moreover, frequently put to great inconvenience and delay on account of the unavailability at times of any locomotive. The successful results obtained with electric factory locomotives by other mills in New England attracted the attention of the managers of the Arlington Mills to the question of electric haulage, and as a result electricity as a motive power was decided upon. The electrical installation consists of a small generating plant and two electric locomotives, one of the box type and the other a platform car. The generating plant consists of a standard G. E. 75 K. W. 500-volt railway generator driven by belt from a high speed engine. The generator readily answers all calls upon it, with no heating or sparking, although it is occasionally subjected to very heavy overloads when both cars are handling a train of more than the usual number of loaded cars.

The boxcar locomotive used for hauling material



ELECTRIC BOXCAR LOCOMOTIVE.

about the yards is shown in Fig. 1, and is equipped with two G. E. 800 H. P. motors and series parallel controllers. The platform locomotive is used to haul trains of loaded cars from the yards to the main line, and empties from the line to the mill tracks, and to do all the drilling in the yards. The equipment of this locomotive consists of two 50 H. P. G. E. 1200 motors, with the necessary series parallel controllers. In hauling heavy trains it is assisted by



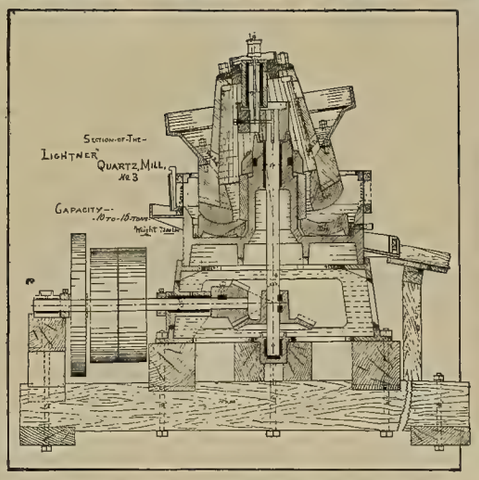
LOCOMOTIVE WITH TRAIN OF CARS.

the boxcar locomotive. Together they are able to handle trains of thirty to forty empties, or twelve to fourteen loaded cars, with comparative ease and celerity. To give the necessary adhesion to the more powerful locomotive to enable it to handle heavy loads, about six tons extra is placed on the platform.

The cost of the entire electric plant is little in excess of one year's rental of the steam locomotive. No more men are employed about the electric locomotive, the labor cost has not risen and the consumption of coal is scarcely felt on the main plant. Furthermore, the plant being always ready, cars may be shifted at any time during the day or night. The appreciation of the Arlington mills is, perhaps, best shown by the fact that a second platform locomotive is shortly to be added to this haulage plant.

The Lightner Mill.

TO THE EDITOR:—In an article headed "Stamps vs. Roller Mills," in your last week's issue, you quote an opinion given by a gentleman from Oakland, in which he holds that roller mills are better adapted for



SECTION OF THE LIGHTNER QUARTZ MILL

crushing clayey and oxidized materials than hard rock. Now this may be the case with such mills as he is acquainted with, but does not apply to such mills as the Lightner quartz mill, which is a roller mill with a crusher combination, being the reverse of the well known "Gates crusher," while the Lightner mill could be built to do heavy crushing. It is thought best to crush the rock to about 2 inches, independently. The Lightner quartz mill consists of a circular mortar, with screens all around it, and a hub or shaft bearing in the center, through which the driving shaft passes and around which are wearing plates for the rock crushing part. In the mortar and around the hub there is a circular, hollow, barrel-shaped muller, which, when working, has a circularly wobbling motion, traveling on its lower end, which has a ring shoe, on a ring die in the bottom of the mortar, the motion being like that employed in moving a barrel, by slightly tipping it and rolling it on its chine, or the ends of the staves.

The rock is fed into a circular hopper surrounding the muller. Thence it passes between the inside of the shoe of the muller and the center wearing plates on the hub in the mortar, where it is crushed as in a rock breaker, then dropping onto the die in the mortar is ground by the rolling muller to any fineness desired, being washed back and forth over inside amalgamating plates or over an encircling riffle containing mercury, and discharged quickly through the screens. The Lightner mill will successfully work any kind of rock, hard or soft, and is adapted to any kind of ore, or to cement gravel. Owing to the peculiar motion of the shoe of the muller on the die in the mortar, the points of contact are constantly changing. The shoe has a slight horizontally rotating motion andd a radial sliding motion, as well as the vertically rolling motion like that of a wheel. This ever changing position of the parts in relation to each other causes an absolutely even or uniform wear of the shoe and die. At the same time the wear of metal is no more than in a stamp mill. The wearing parts are of extra hard cast iron and can be procured at any ordinary foundry, and are easily put in place.

The Lightner mills are cheaper to erect, and can be put in running order and paid for from the product of the mine before a stamp mill can be set up and the first stamp dropped. It also requires but one-half the power to do the same quantity of work as the stamp mill, and causes no deafening noise while running. There are a number of Lightner mills of from 1 to 15 tons' capacity per day in operation, proving by their satisfactory working, substantial construction, slight wear and tear, little power required, ease of management and increasing demand, that they are the best style of quartz mill in the market. The illustration shows a section of a No. 3 mill; other sizes are similar. These mills are built in four sizes by Wm. H. Birch & Co., First street, in this city, well known for their superior work in all lines of machinery, and is a guarantee that the mills will be delivered in perfect order. JOHN J. NEWSOM.

49 Merchants' Exchange, S. F.

Concentration of Cinnabar Ores.

TO THE EDITOR:—A southern Oregon correspondent in last week's issue suggests concentration of low-grade cinnabar ores. I wish to show that such concentration can be of no advantage except in very rare cases.

The furnace treatment of cinnabar ores is one of the simplest and least expensive of metallurgical processes. No method of concentration can do away with the cost of mining, and it is the cost of mining and not the cost of reduction which is the important factor.

The cost of both mining and reduction must vary widely according to circumstances, but in a country like southern Oregon where wood is only worth $1.50 per cord, the cost of reduction is less than 10 cents per ton for fuel, and the handling of the ore is the only other part of the expense of reduction, except coarse crushing through a breaker at a cost of less than 5 cents per ton. Any method of concentration involves fine crushing, vanning or jigging, and a handling of the material, costing fully as much per ton as the furnace treatment.

Briefly then, concentration is unavailable because it generally would cost more than direct treatment of the ore as it comes from the mine. The only possible exception to this would be where a large body of low-grade ore could be quarried and concentrated by free water power in a locality where cord wood was very expensive.

The small furnaces suggested are not conducive to economy. Those of 10-ton capacity are being supplanted by 40-ton furnaces, corresponding with the practice in ironworks where the capacity of furnaces is ten times what was thought desirable thirty years ago.

Referring to the idea that the manipulation of the Spanish mines is the reason for the quicksilver business not being lucrative, I think one does not need to go so far afield as Spain to find the cause. The paying mines of to-day are properties which had been abandoned, or had been worked at a loss, or had been thought to be exhausted because some rich bunch of ore gave out, till taken hold of by men who knew how essential it is constantly to keep prospecting ahead of immediate requirements.

R. B. SYMINGTON.

In Effect Next Saturday.

The Commissioner of the General Land Office, under instructions from Secretary Bliss, has fixed July 1, 1898, as the time when the old construction of the mining law, so far as it affects the patenting of groups of mining claims, will expire. On or after next Saturday the new construction, that of Dec. 15, 1897, will take effect.

Paragraph 53 of the mining regulations, approved Dec. 15, 1897, was amended to read as follows:

"The claimant at the time of filing the application for patent, or at any time within the sixty days of publication, is required to file with the register, a certificate of the Surveyor General that not less than $500 worth of labor has been expended, or improvements made, by the applicant or his grantors, upon each location embraced in the application, or if the application embraces several locations held in common, that an amount equal to $500 for each location has been expended upon, and for the benefit of the entire group; that the plat filed by the claimant is correct; that the field notes of the survey, as filed, furnish such an accurate description of the claim as will, if incorporated in a patent, serve to fully identify the premises, and that such reference is made therein to natural objects or permanent monuments as will perpetuate and fix the locus thereof; *provided*, that as to all applications for patent made and passed to entry before July 1, 1898, or which are by protests or adverse claims prevented from being passed to entry before that time, where the application embraces several locations held in common, proof of an expenditure of $500 upon the group will be sufficient, and expenditure of that amount need not be shown to have been made upon, or for the benefit of, each location embraced in the application.

"BINGER HERMANN, Commissioner.

"Approved: C. N. Bliss, Secretary."

It will be observed that the $500 need not be expended "on" each claim where the application comprises several locations, but "for" each claim. The aggregate amount in such cases must represent as many times $500 as there are locations, and in such case the entire amount can have been expended on one of the claims provided it can be shown that such amount tended to develop or improve entire group.

A Simple Air Compressor.*

C. P. TURNER.

The hydraulic air compressor herewith illustrated is an application of an old principle, viz., the tendency of a current of any gas or liquid, flowing through or around another fluid, to carry the surrounding fluid along with it. A mixture of the two will thus be formed, which, if the strength of the current is great enough, will be carried along through any tube or closed channel that may be provided for their passage. The application of this principle to the injector, the jet pump, the steam blower, and similar devices—where a current of steam flowing from a nozzle with a high velocity is made to propel water or air from a chamber surrounding the jet through a pipe leading to the required point of discharge—is familiar to machinists and engineers.

One of the earliest devices for furnishing a blast of air for blowing the fires used in making iron from its ores, where other power than that furnished by the muscular exertion of men or animals was employed, was the blower shown in Fig. 1 and called a

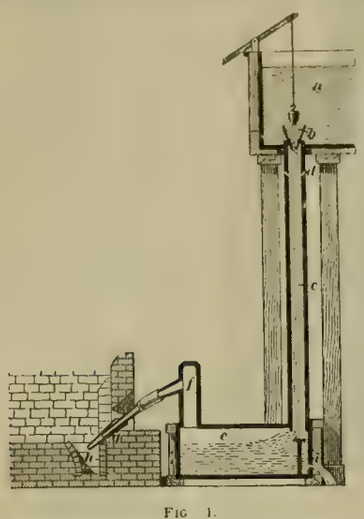


FIG 1.

trompe, a jet of water flowing down through the conical nozzle *b* from the sluice *a* into the pipe *c*. The jet, in its passage through the pipe, carries the surrounding air with it, thus drawing a steady current of air in through the holes *d* and carrying it down into the chest *e*. The water settles to the bottom of this chest and flows through the hole *i*, while the air rises to the upper part and from there is forced out the pipe *f* and the nozzle *g* into the fire on the hearth *h*. This device, while simple and cheap, was not capable of furnishing a high pressure of blast, and never reached a high degree of efficiency in the use of the falling water, the best efficiency obtained, according to good authorities, being not more than 15 per cent. For these reasons its use has always been limited to periods and districts where only the most simple mechanical devices could be obtained.

Another and more modern application of this principle is seen in the "injector" condenser shown in Fig. 2. In this case the work to be done, instead of taking air from the surrounding atmosphere and

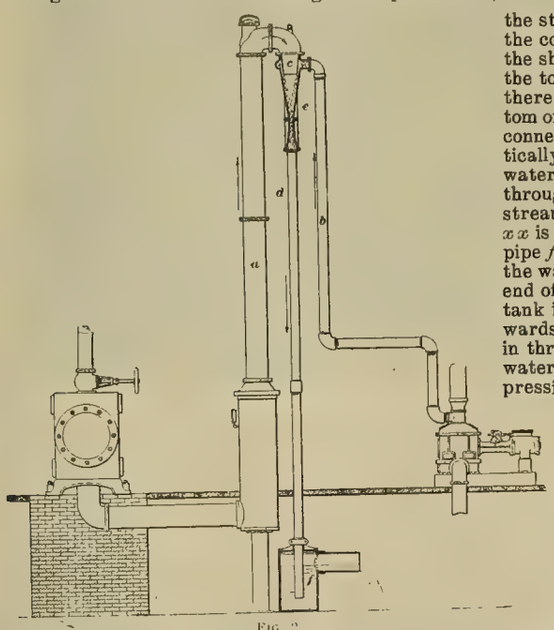


FIG 2.

delivering it at an increased pressure in an enclosed vessel, is to remove the air and vapor from a closed space and deliver it into an open vessel against the pressure of the atmosphere; at the same time the water that is employed in removing the air from the the exhaust pipes serves also to cool and condense the exhaust steam.

In Fig. 2, which shows the condenser attached to a Corliss engine, the exhaust steam passes from the cylinder through the pipe *a* to the top of the condenser. Water from a pump, or other source of supply, enters the condenser through the pipe *b*, surrounds the conical inlet *c*, and flows downward around the lower edge of this inlet in a thin stream. The exhaust steam from *c* is condensed by coming in contact with this stream of water, and at the same time any air that may have entered the cylinder or exhaust pipe, and any condensed vapor, are caught by the downward current of water and carried through the discharge pipe *d* into the hotwell *f* below. The lower end of the discharge pipe dips below the surface of the water in the hotwell, so as to prevent any return of air through it when the condenser is not working, or when the quantity of water flowing through it is insufficient to keep the pipe filled.

In order to obtain a good vacuum it is necessary to make the length of the discharge pipe great enough to provide a column of water whose weight will balance the pressure of the atmosphere; that is, the condensing tube *e* must be placed at least 34 feet above the surface of the water in the hotwell.

Coming to the hydraulic air compressor under discussion, we found the principles illustrated above extended so as to utilize the fall of large quantities of water in compressing air to a pressure great enough to make it available in driving air pressure engines and pneumatic machinery of all classes. A deep well, or shaft *a*, Fig. 3, is dug in the vicinity of

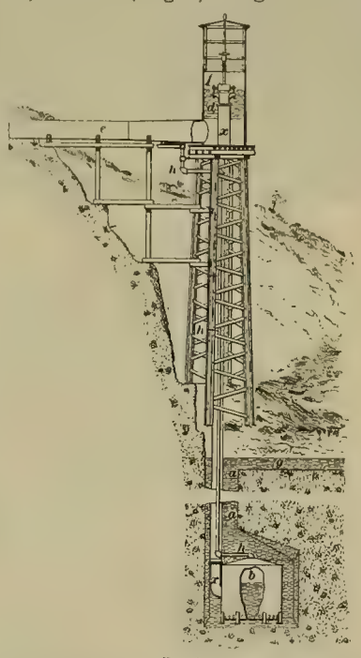


FIG. 3

the stream below the fall, and a large tank *b*, called the compression tank, is placed at the bottom of the the shaft. The compression tank, which is closed at the top and open at the bottom, is so placed that there is a space between the bottom edge and the bottom of the shaft, as shown in the figure. A tube *x x* connects with the compression tank, and rises vertically to a level, a little below the surface of the water in a receiving tank *d*, which is supplied through a penstock, or flume *e*, leading from the stream above the fall. The upper end of the tube *x x* is slightly enlarged, and is fitted with an air inlet pipe *f*, which leads from a point above the surface of the water in the receiving tank, down into the upper end of the tube. Water flows from the receiving tank into the upper end of the tube, and flows downwards past the end of the air inlet pipe; air is drawn in through the pipe *f* by the downward current of water, and is carried with the water into the compression tank. Here the velocity of the current of water and air is checked, thus allowing the air to separate from the water and rise to the top of the tank, while the water is forced out below the bottom edge, rises through the shaft, and finally flows away through the channel of the stream below the falls. As will be readily seen by an inspection of the figure, the air in the compression tank is subjected to a pressure proportional to its depth below the surface of the water in the overflow channel *g*, and is thus compressed to a degree depending on the depth of the shaft.

Since a head of water equal to a depth of 1 foot produces a pressure of .434 pound per square inch, we see that in order to get air at a given pressure—say sixty pounds per square inch—the shaft must be deep enough to bring the air in the compression tank 60 ÷ .434 = about 138 feet below the surface of the water in the overflow channel.

A pipe *h* leads the air from the compression tank to the mill or mine where it is to be used.

The quantity of air that will be furnished by this device depends on the height of the fall, the quantity of water that can be used, and the construction of the air and water inlets. As has been said, the efficiency of the old trompe for furnishing a blast was very low, and the pressures obtained were small; consequently it has generally been replaced by some form of blower driven by a water wheel or other power. The makers of this compressor, however, claim a good efficiency for their apparatus, and, as has been seen, the pressure obtained may be made as great as may be desired by making the shaft sufficiently deep. Some of its apparent advantages, as a method of utilizing a fall of water for producing a supply of compressed air, are its simplicity of construction, which should make the cost of operation and maintenance small, and the fact that the air, while being compressed, is in such close contact with water that the heat developed during its compression is at once absorbed by the water, thus allowing the compression to take place at a practically constant temperature, and reducing, to a considerable extent, the work required to compress a given quantity of air.

* Condensed from Home Study Magazine, June, '98.

Some Metallurgical Methods at Broken Hill, Australia.*

NUMBER VI.—CONCLUDED.

Zinc Recovery.—No effort has been made until lately in Australia to recover the zinc from the ore, either directly or from the by-products of the zinc tailings. The Ashcroft process for the recovery of zinc has now been at work some time, but so far no results have been published as to its success or otherwise. The process this company originally started with was an electrolytic one. The ore was to be roasted, and then leached with ferric chloride, oxide of iron depositing with the residual ore, and a zinc chloride being produced. This, on purification from any gold, silver, or copper dissolved, was then subjected to the electric current in vats, the anodes being iron and the cathodes zinc. The idea was to regenerate the ferric chloride again, but it is said that some difficulty has been experienced in making the cycle of operation act properly; in fact, that the chlorine, instead of being all liberated as hydrochloric acid, and therefore in a condition to act on the iron anodes, is liberated as free chlorine and is lost. The amount of manganese in the ore, and which goes into solution on leaching the roasted ore with the ferric chloride, is also said to have interfered considerably with the deposition of the zinc, more especially after the leaching solution has got somewhat charged with the salt of this metal. By their latest reports, however, they claim to have overcome all the difficulties which have delayed them in the past, and we hope to hear in the near future of the results of their efforts. The chief ore supplies which the mines now have left are, apparently, unlimited supplies of zincose lead sulphide, and there is no doubt of the effect a good process for zinc would have on the prosperity of the whole of the sulphide mines.

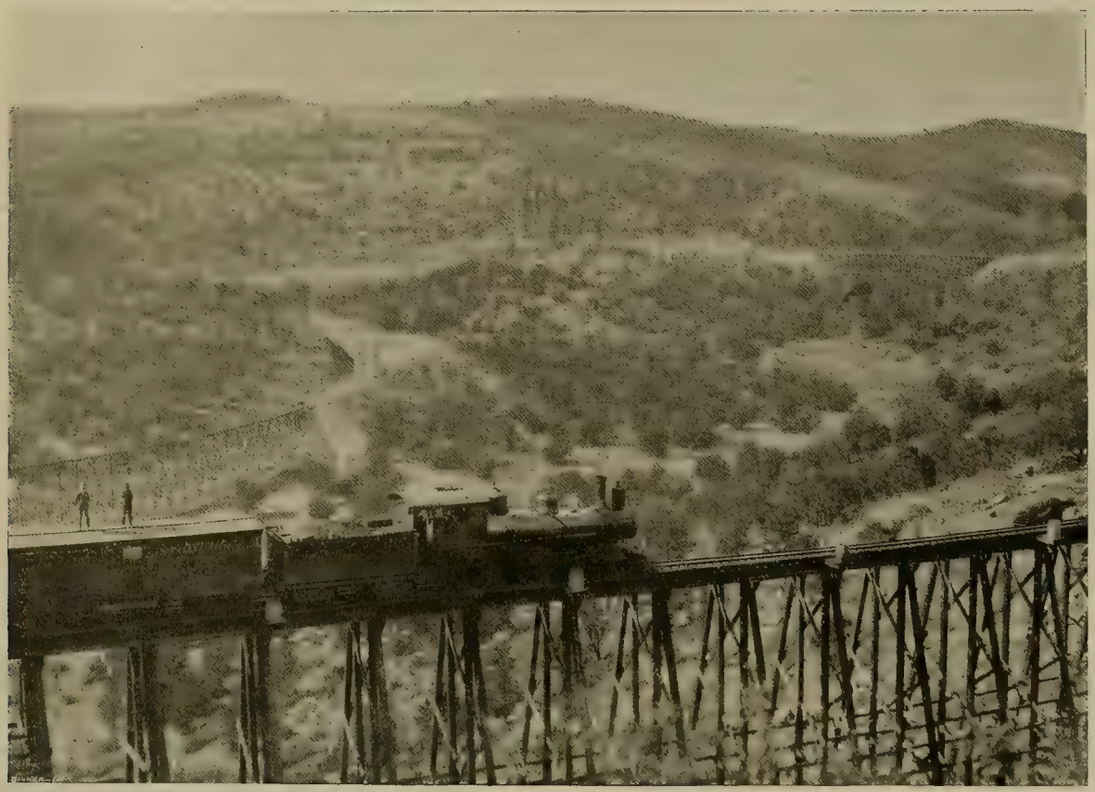
Other attempts have been made to recover the zinc, amongst which is an ammonia process brought out by Mr. Carmichael, late of Block 10, and now of the Proprietary. This is based on the following reaction:

1. $Zn\ O + (NH_4)_2\ SO_4 = Zn\ SO_4 + 2\ NH_3 + H_2\ O$.
2. $Zn\ SO_4 + 2\ NH_3 + H_2\ O = Zn\ O + (NH_4)_2\ SO_4$.

A short description of the process is as follows: The ore is first finely ground and roasted, to leave as much of the zinc as possible in the state of the soluble sulphate. It is then placed in iron retorts and heated with sulphate of ammonia to complete this part of the process and bring about the first reaction given. The ammonia distils off through a pipe leading from the end of the retort, and dips below the surface of a solution of zinc obtained by leaching with water ore, which has been subjected to the retort treatment. The second reaction $Zn\ SO_4 + 2\ NH_3 + H_2\ O = Zn\ O + (NH_4)_2\ SO_4$ is then obtained. The precipitated zinc oxide is filter-pressed out, and the filtrate of diluted regenerated sulphate of ammonia has then to be evaporated and crystallized out ready for use again. Like all ammonia processes, the extreme difficulty of making the joints in the various parts tight when free ammonia is present has been, in this process, the stumbling block. It is now stated that this difficulty has been overcome, and, if so, we may soon hear of oxide of zinc being prepared by the Proprietary Company from their ores. The process is a beautiful one in its chemical reactions, but hitherto the loss of ammonia has been prohibitive of its use. Other oxide processes are the magnesite and the calcium chloride processes, both owned by the Smelting Company of Australia, but so far no attempts have been made

* Condensed.

to start work with them on a large scale. This company also owns the Siemens-Halske electrolytic process for the production of metallic zinc. The solvent used with this process to extract the zinc from the roasted ore is either sulphuric acid, or sulphate of iron and alumina, or sulphate of alumina alone. There is no doubt that sulphate of iron would act as a good solvent for the zinc, and, unlike the leaching solution Ashcroft process, all of them could be regenerated with no loss, except leakage from pipes and waste of that kind. I am trenching on the delicate ground of the problem of the sulphide ores, and therefore will say no more on the zinc recovery processes; but before leaving the subject I may be permitted to hope that so vast a field will continue to find workers, and that in time the just reward of their efforts will be obtained, and the wealth of the immense sulphide mines of Broken Hill be brought within reach.



ON THE SANTA FE, PRESCOTT & PHŒNIX RAILWAY.

Development of Arizona.

Arizona is attracting deserved attention. A prominent factor in the mineral development of that Territory are the railroads, lack of adequate means of transportation having been a serious drawback to the mining industry. The Santa Fe, Prescott & Phœnix Ry. Co. is aiding in the development of central and southern Arizona. From Ash Fork (west of Flagstaff) this road extends southward through Prescott to Phœnix. On this page and the following are presented three characteristic scenes on that road, which, in its building, presented many intricate problems in railroad engineering which have been successfully solved. In the issue of the 11th inst. appeared a detailed description of the great steel dam built near Ash Fork, the northern terminus of the road. The S. F., P. & P. Ry. Co. is now building a branch line from Massicks, a short distance north of Prescott, to Mayer, twenty-six miles, developing a promising mining region.



VARIOUS ELEVATIONS NEAR ROCK BUTTE ON THE S. F., P. & P. RAILWAY.

Liability for Injury to Miner.

When the superintendent of a mine, knowing that stones had been constantly falling down the surface of the mine at a certain place, and that it was more dangerous than other parts of the mine, put a miner at work immediately under it without informing him of the danger, or without having the surface raked, the owner is liable for the resulting injury to such miner, who was ignorant of the danger. (De Weese v. Merameo Iron Mining Co., Supreme Court of Missouri, 31 S. W. Rep. 110.)

Experimenting With and Process by Which Sulphurets from the Plymouth Rock, Cal., Mine are Worked.

About a year ago T. K. Code was engaged by T. T. Lane to find a cheap process for working the sulphurets of the Plymouth Rock mine, six miles north of Milton, Calaveras Co., Cal., for which they had been paying $15 per ton. The process by which the ores is now worked costs $6.50 per ton. The sulphurets contained 8% to 30% zinc, 1% to 5% copper, 3% lead, 5 ozs. and 7 ozs. silver and 1½ oz. gold.

In the following article Mr. Code gives the details of the experiments and results. It is believed that the process was based on an original idea of his own:

Chemical analysis showed, besides gold and silver, copper from 1% to 5%; zinc from 8% to 30%; lead 0% to 3%. Some 2000 tons were on the dump and by exposure had oxidized sufficiently to make a preliminary washing a necessity before cyanide treatment. But the percentage of copper sulphide was high enough to make the process costly in consumption of cyanide. It was then decided to roast the ore, leach out the salts and treat the residues by cyanide.

Experiment No. 1.—At the Utica plant, Angels Camp, ten tons were roasted in an ordinary reverberatory furnace, the roasting occupying about seven hours. While cherry red 400 lbs. salt was added to each ton of roasted ore and the roast continued for some minutes longer, thus converting the copper, silver, zinc, lead and some iron into soluble chlorides. After standing in piles for about six hours the roasted ore was placed in leaching tanks capable of holding two tons, and for a filter 6 inches of gravel were used. After standing for ten hours in 300 gals. water per ton of ore, the solution was allowed to filter off and run to a reservoir and used as spoken of hereafter. To take out all remaining traces of copper as far as possible, 15 lbs. of sulphuric in 75 gals. water were now added and after standing six hours in contact drained off. To get rid of acid water was allowed to run on ore and drain off at same time. After draining pretty thoroughly (moisture of 4%) the ore was removed to cyanide agitation and there treated by that process.

By roasting one would naturally suppose the zinc going off more or less as an oxide, some gold would be carried with it. At a high temperature this undoubtedly would take place. From 5% to 8% of zinc went off as oxide and generally it deposited in back of oven and at foot of stack. The doors of the furnace were always covered by the white powder. As the temperature was low while roasting no gold was lost, and as the ore lost in weight so the value per ton increased. If the ore was not allowed to stand some time after drawing from the furnace, it had a tendency to bunch up into balls from 1 inch to 6 inches, and for an hour or two after being piled the interior of the pile was red hot. The object was to allow thorough chloridizing.

Cost.—This way of working the sulphurets cost $8.75 per ton. It has several obvious drawbacks besides the cost; has to be handled too much. It cost $2 per ton treated for salt and constant analyses by a chemist, as the process has to be carefully watched.

Extraction.—The extraction by this process was for gold from 90% to 98.2% and for silver 75% to 86%. The copper extraction was never more than 68%.

Experiment No. 2 and Present Process of Working the Sulphurets.—The sulphurets are roasted and treated

by chlorination in the ordinary way, the chlorine taking the gold, copper and zinc into solution from which the gold is precipitated by sulphate of iron and the solution run off to reservoir above spoken of. Then the residues are treated with hyposulphite solution for the silver and after precipitating the silver the solution is pumped up to leach next batch.

Extraction.—The extraction of gold is 95%, silver 90% and copper about 60%.

Treatment of Solution for Copper and Zinc.—The solution coming from experiment No. 1 being a chloride and sulphate solution respectively, was more easily treated by electrolysis than the solution as obtained in experiment No. 2.

The electrolytic plant consisted of dynamo and twelve tanks, each 3'x4'x1', inside measurements. These were arranged one above the other on a slight grade, the top of each tank being connected by a rubber hose with the bottom of the next tank, the two holes in each tank being diagonally opposite so as to promote circulation. Plates used were alternate lead and copper 2 inches apart and allowing about an inch all around free. These were suspended from ¼-inch copper wires running across tank.



POINT OF ROCKS, SEVEN MILES NORTH OF PRESCOTT, ON THE LINE OF THE S. F., P. & P. R. R.

(*See Opposite Page.*)

The deposit of copper was at first spongy, most of it falling off plates and sinking to the bottom of vat. But after careful study and manipulation, in which lime was used to neutralize excess of acid, a firm deposit of red copper was obtained. After exhausting all the copper in the solution zinc plates were put in place of the copper and the voltage increased. About 30% of the zinc in the solution could be obtained free from iron, but above that the iron would come down on the plates. As fast as the zinc deposited, lime was added in known quantities to keep up the neutral state of solution. The precipitated zinc used in the cyanide plant worked very successfully.

The solution from experiment No. 2 as it now comes from the chlorination plant offers many difficulties to the electrolytic process, on account of the mixture of salts and solutions, and as the copper has been running too low to treat electrically, scrap iron is used and the cement copper scraped up, sacked and sent to smelter. Should the percentage of copper increase enough to warrant it, the dynamo will probably be started again.

Cost.—Cost of working ore at present time, as shown in experiment, is $6.25 per ton treated.

T. K. CODE.

A Decision in Point.

In the issue of May 28, '98, editorial reference was made to the question of cutting timber upon mineral lands in California and a decision cited in the case of the U. S. vs. Benjamin. Subsequent inquiry makes it manifest that the publication of that decision would be of interest to the mining world. It is accordingly appended in full:

UNITED STATES v. BENJAMIN.

Circuit Court, District of California (21 Fed. Rep., 285). Public Lands—Cutting Timber on Mineral Lands in California—Act of June 3, 1878, chapters 150–151.

Timber upon mineral lands in the State of California is protected and governed by the provisions of the Act of June 3, 1878, chapter 151 (20 Stat., 89), made specifically applicable to that State, and not by the general provisions of chapter 150 of the Act of June 3, 1878, (20 Stat., 88), which can only operate upon "mineral districts," if any there be, not specifically provided for by designating the particular State or Territory in which it is situated by name.

SAWYER, J.: The United States bring this action to recover the value of lumber alleged to have been manufactured from timber trees unlawfully cut on the public lands. The defendant, as a justification, specially answers that the trees from which the lumber in question was manufactured grew and were cut "in a mineral district of the United States," known as such throughout the State, and so recognized by the customs of miners and the decisions of the courts, and designated "the Georgetown Mineral and Mining District," being "in the mineral belt of said State of California and county of El Dorado;" that defendant was and is a citizen of the United States, and a bona fide resident of said "Georgetown Mineral District;" that the land on which said trees grew was public land of the United States, mineral in character, and not subject to entry under existing laws of the United States, except as mineral lands; that the lumber "was used in said mineral district and adjoining mineral districts of said county of El Dorado for building, agricultural, mining, and other domestic purposes, but principally for mining purposes; that said timber was felled, removed, and used for the said purposes, * * * in accordance with the rules and regulations prescribed by the Secretary of the Interior;" and that said timber "was felled and removed, and said act committed, under a license from the United States, under and by virtue of an Act approved June 3, 1878, entitled "An Act authorizing the citizens of Colorado, Nevada and other Territories to fell and remove timber on the public domain for mining and domestic purposes."

The Act under which defendant attempts to justify provides—

That all citizens of the United States, and other persons bona fide residents of the State of Colorado, or Nevada, or either of the Territories of New Mexico, Arizona, Utah, Wyoming, Dakota, or Montana, and all other mineral districts of the United States, shall be and are hereby authorized and permitted to fell and remove, for building, agricultural, mining, or other domestic purposes, any timber or other tress growing or being on the public lands; said lands being mineral and not subject to entry under existing laws of the United States, except for mineral entry in either of said States, Territories, or districts of which such citizens or persons may be at the time bona fide residents, subject to such rules and regulations as the Secretary of the Interior may prescribe for the protection of the timber and of the undergrowth growing upon such lands, and for other purposes.

The United States attorney insists that this Act is not applicable to the State of California, and, consequently, it can afford no justification of the acts complained of. The defendant, on the other hand, contends that the words "*all* other *mineral* districts of the United States" embrace every "*mining* district," recognized as such by the customs of miners or the locality embracing it, in whatever State or Territory it may be situated. A similar question arose in the Circuit Court for the district of Oregon in U. S. v. Smith, in which Deady, J., after a full and careful consideration of the question, held that the Act did not apply to the State of Oregon (U. S. v. Smith, 8 Sawy., 101; S. C., 11 Fed. Rep., 487). If it does not apply to Oregon, for similar reasons it is inapplicable to California.

After a careful consideration of the question, I am constrained to concur in the conclusion reached by the District Judge of Oregon, and hold the provision to be inapplicable to California.

If this Act stood alone, the position taken by the defendant's counsel would not be without plausibility. But, unfortunately for him, it does not stand alone. On the same day another Act was passed, specifically applicable to timber lands in the States of California, Oregon, Nevada and Washington Territory, which contains provisions wholly inconsistent with the provisions relied on in the Act relating specifically to Colorado and the Territories therein named. It does not appear which Act was in fact first passed, but probably it was the first-mentioned Act relating to Colorado, etc., as that is designated in the statutes as chapter 150, while the Act relating to California, etc., is numbered chapter 151 of the statutes (see 20 Stat., 88, 89). If the latter Act is to be treated as a subsequent statute, it repeals the inconsistent provisions of the prior Act, as it expressly provides that "all Acts and parts of Acts inconsistent with the provisions of this Act are hereby repealed," (Sec. 6). But the most favorable view for the defendant is to regard the two statutes, as they were both passed on the same day, as constituting but one statute, the former part of the Act making specific provisions for Colorado and the other States and Territories named therein. So viewing the statute, we must, if possible, construe all the provisions in such manner that every part can stand and have effect.

In such cases, also, loose general provisions of doubtful import in the former part of the statute must yield to subsequent clear and specific provisions, which are so explicit as to admit of but one construction. The clause "all other mineral districts of the United States," in the first-named Act, as shown by Deady, J., in the case already cited, is very general and exceedingly indefinite and uncertain as to its application, while the provisions of the other Act are made *specifically* applicable to the State of California by terms so clear and explicit as not to be open to any other construction. The most that can be said of the general clause is that it can only refer to "all other mineral districts of the United States" not otherwise specifically pointed out by other provisions of the Act—the two Acts being regarded as one. But California is otherwise specifically provided for. In my judgment, the timber upon the public lands in the State of California is protected and governed by the provisions of the second Act, made specifically applicable to California, and not by the loose *general* provisions of the first Act, which can only operate upon "mineral districts," if any there be, not specifically provided for, by designating the particular State or Territory in which it is situated by name.

To hold otherwise would be to make the specific and certain yield to the general, indefinite, and uncertain, which would be contrary to the well-established canons of statutory construction. The second Act expressly provides "that after the passage of

this Act it shall be unlawful to cut, or cause or procure to be cut, or wantonly destroy, *any timber* growing on *any lands* of the United States in *said States* and Territories," of which California is the first specifically namad in the Act: "*Provided*, That nothing herein contained shall prevent any *miner* or *agriculturist* from clearing *his* land *in the ordinary working* of his mining claim, or preparing his farm for tillage, or from taking the timber necessary to support his improvements." Thus it will be seen that the right to cut timber is much more restricted as applied to the States and Territories named in this Act than the right conferred on the residents of the States and Territories named in the other Act. In this Act the right is limited strictly to the *miner* and *agriculturist*, and is restricted to cutting timber on his *own mining claim* or *farm*, and to the purpose of clearing in the "ordinary working of his mining claim, or "preparing his farm for tillage," and to "taking the timber necessary to support *his* improvements." The part of the answer in question does not show defendant to be either a miner or farmer, for that he cut the timber on his own mining or farming claim, or that he did it for any of the designated purposes. Indeed he does not attempt to bring himself within the provisions of this Act relating specifically to California, but he relies wholly on the other Act, which specifically relates to Colorado, and the other Territories and districts therein named, in general indefinite terms, which latter Act is much more liberal in its provisions than the other.

It follows that the facts alleged are insufficient to constitute a defense, and, if true, are wholly immaterial.

The demurrer must be sustained, and the motion to strike out granted; and it is so ordered.

The Rule of Safe Place.

The doctrine that a mining company can send its employes into the bowels of the earth to conduct its mining operations without making any provision for the proper supervision and inspection of the mine for the security and protection of the miners and the mine, is unsupported by authority, is opposed to sound public policy, and is cruel and inhuman. Miners do undoubtedly take upon themselves all the ordinary and usual risks of the business, but what are these ordinary risks? They are the risks incident to the business when it is conducted by the mine owner according to the customary and approved methods and with due regard to the safety of the miners. The neglect of the mine owner to discharge his duty in this regard is not one of the risks assumed by the miner, but is a negligent act on the part of the mine owner which renders him liable in damages to any miner injured thereby. It is the duty of the mine owner to provide a competent foremen or inspector to superintend the working of the mine; it is the duty of this foreman to direct the miners when and where to work; and it is particularly his duty to make timely inspection of the timbers and walls and roof of the mine, in order that no harm may come to the miners from causes which a capable and diligent inspector would discover, and, when discovered, remove or cause to be removed. Where blasts are used in a mine, it is the imperative duty of the foreman to be diligent in discovering the effect of the blast upon the timbers, walls and roof of the mine, and to point out to the miners any dangerous conditions resulting from the blast, and to cause these conditions to be removed without delay, by proper appliances and with as little danger to the men as practicable. Mining is a necessary and permanent business, and must be conducted in an intelligent, orderly and systematic manner, not alone for the protection of the miners, but for the preservation of the mine itself. For these reasons, the business must have an intelligent and competent head. The necessity for this is imperative. When properly conducted, there is no pursuit in the country carried on with greater regularity, system and order, and with a stricter observance of rules intended to secure employes against accidents and property from loss or damage. The conditions confronting the miners from day to day, as a rule, are neither unexpected nor unusual. They are the common and expected incidents of mining, and, when the foreman does his duty, they are provided for and met without accident or any special danger. There is nothing hasty or haphazard about the business. (Finlayson v. Utica Mining & Milling Co., Circuit Court of Appeals, Eighth Circuit, 67 Fed Rep. 507.)

Sale of Old Metal.

The area bounded by Market, Third, Bryant and Spear streets, San Francisco, supplies considerable in the way of waste metal, from the sale of which some money is made by those who make a specialty of handling it. On the Atlantic side, under the generic name, borings, are grouped the different grades of waste iron which must be handled by shovelfuls or by the barrel. Borings may be of cast-iron chips, wrought-iron turnings, needle-point chips or steel turnings. In some large scrap-iron yards but two words are used to describe these fine particles of iron. Under the general title, "borings," are cast-iron chips and needle-point iron, while "turnings" is descriptive of the small, crescent-shaped particles of wrought iron and the long shavings of wrought iron and steel produced by the planing machine.

Cast-iron borings are the by-product of all machine shops and foundries. Sometimes, when the quantity produced is small, the cast chips are mixed with the wrought-iron turnings or thrown out with the waste molder's sand from the foundries. Larger shops usually keep the grades separate. As these cast chips are merely the trimmings from the castings where the hot iron found a small defect in the mold, or the crank dividing the parts of the mold one from the other, one might suppose that it would take a long time to produce a ton of 2240 pounds of waste in this manner, but many of the large machine shops and foundries in and about New York and Philadelphia produce from three to five gross tons of borings and turnings per week.

When one considers that, on a rough calculation, a pound of chips represents the waste from fifty pounds of finished castings, some conception of the magnitude of the iron industry thereabouts may be had. Borings and turnings are sold by their producers to scrap-iron dealers on yearly contract if the quantity be large. These dealers cart them away from the shops to their yards or ship them directly from the shop to the customer whenever practicable. Cast iron is a bright gray in color, and the particles consist of splinters but slightly held together, which are readily separated by a blow from a hammer, for cast iron, even in bulk, is very brittle.

Needle-point iron is produced in foundries where chilled rolls are prepared. Ordinarily, the molten iron is allowed to cool slowly, but when it is desired that the castings shall be harder than usual the iron is quickly cooled by thrusting it into water. Because of this hardening the trimming knives take off narrower and longer particles. The fine dust of both cast and needle-point iron is sold to lithographers or to the manufacturers of fireworks, whence it reappears on the Fourth of July in the form of sparks from the Roman candles, rockets, pinwheels, etc., the explosion heating it temporarily to a white or red heat, according to the amount of powder present.

Wrought-iron turnings are the product of all machine shops. Formerly these turnings were sold covered with oil which is used to facilitate the passage of the drill through the plate of iron, but in most shops to-day turnings are wrung out, so to speak, in a centrifugal machine, and the oil thus saved for reuse is a considerable item of economy in large shops.

It should be noted that borings and turnings are more properly by-products of the iron business than scrap iron, for the latter includes the wastes of other manufactures. All old machinery that cannot be sold second hand is turned over to the scrap iron dealers for breaking into pieces convenient to handle. Old boilers are purchased in place by these dealers, who then employ men to whom boiler breaking is a trade, and, working with huge iron hammers and steel wedges, the bolts are quickly cut and the boiler plates recovered separately. Boilers costing originally from $100 to $2000 are worth but their weight in iron when sold to a dealer in scrap iron, and rarely net more money to the factory discarding them than $25.

Old pumps, engines, and machinery of every description may be found in iron yards, preserved in their entirety if there be the remotest chance of selling them to an unwary purchaser, but usually old machinery is broken up as fast as it is received, the brass parts piled together and the iron, cast and wrought, and the steel piled separately. Old horseshoes, barrels, hoops, iron pipe and old rails are all grist to the mill of the scrap iron dealer, and for each he has his especial list of customers, who use that particular grade of iron, each for his own particular purpose.

Of recent years borings and turnings have found a different outlet than the familiar return to the furnace or cupola. Our chemical industry claims large quantities of them yearly. A large firm in Cleveland, Ohio, utilizes all its borings and mill scale for the production of green vitriol, more commonly known as copperas. Copperas is largely used as a disinfectant, in dyeing fabrics, and in the chemical trade; also for the production, by incineration, of the rouge used for polishing brass or silver.

In all of these chemical uses the iron is dissolved in acids, such as oil of vitriol to make copperas, muriatic acid to make muriate of iron, and nitric acid to make nitrate of iron. These solutions are then evaporated to crystals for convenience in shipment, or utilized in solution by their manufacturers. Formerly large quantities of copperas were imported into this country, but now nearly all of the green vitriol is made in America.

Prices in the scrap iron market are necessarily controlled by the price of pig iron, for the greater part of the borings and scrap iron produced finds its way back to castings again, through the medium of furnaces or cupolas, adapted especially for handling material so dense as borings and turnings. The prices of the latter range from 20 to 25 per cent lower than prices of pig iron, and a few foundries find it economical to use them alone.

Scrap iron commands a relatively higher price than borings or turnings, for foundries fitted up to use pig iron can very conveniently make use of large pieces of scrap iron for melting, and thus its market is less restricted. Borings and turnings labor under another disadvantage, however, for, in comparison with the larger pieces of waste iron, the former are impure. Stored on the floor under the machines they are exposed to the accumulation of dust from the floor, dirty waste used by the workmen to wipe oil from their hands, tools carelessly thrown down and forgotten in the rush of work, rubbish of every sort, and brass or lead filings from finishing departments. This accumulation of impurity entails a loss in iron of from 10 to 20 per cent in weight to the purchaser, hence their lower price.

Precautions Against Malaria.

W. T. Hornaday gives the following advice to soldiers about to go to Cuba: "After living in the most malarious jungles on earth, in the midst of swamps, drinking swamp water, and often having to eat unaccustomed and badly cooked food, I never had but one touch of jungle fever, and that only laid me up for six or seven days. I owe my excellent health to two or three precautions. I never slept on the bare ground or in the rain, and always under shelter. I always wore light flannels next to the skin, and never slept in damp clothes. Whatever else I might have to do without, two changes of flannel underwear besides that I had on were always at hand. Take from five to six grains of quinine every morning in a cup of hot coffee, if you have it; if not, then in hot water. Have your shoes to fit you, even if you must buy them yourself, though the United States is furnishing its troops with an excellent marching shoe. With these precautions and a dose of some light laxative once a week, there need be no more fear of fever in Cuba than there is in California."

Gun Cotton.

In these war days mention is made of gun cotton among other high explosives. The process by which so common and harmless a substance as cotton is converted into a high explosive is a simple one. Ordinary cotton waste is steeped in a solution of one part of nitric acid and three parts of sulphuric acid. The nitric acid renders the cotton explosive, the sulphuric acid being required only to absorb the water. After the cotton has soaked in the acids for several hours, it is taken from the pots and squeezed through heavy rollers to extract all the superfluous acid which it has not absorbed. Then it is washed carefully and thoroughly, still with the same object of removing the free acid. If any of this remained, its tendency would be to cause chemical changes in the gun cotton and decompose it. After being washed it is passed through a machine similar to that which grinds up the rags in a paper mill. Here it is crushed thoroughly and afterwards washed again until the last trace of free acid disappears, and the cotton comes out in the form of a soft, white pulp, closely resembling the pulp of which paper is made.

This concludes the process of actual manufacture, and it now remains only to convert the gun cotton into the most convenient form for the use to which it is to be put. If it is to be employed in making powder it is dried and stored away in pulverized form; but if it is designed for filling torpedoes it must be compressed to a certain density and moulded into the shapes which will best enable it to be packed into the torpedo heads. These shapes vary according to the design of the torpedoes and the method of packing. Sometimes they are discs and sometimes cylinders, flat squares, or cubes.

If uncompressed and dry the gun cotton would be extremely light, weighing no more than ordinary cotton wadding; but when made into the above forms it is compressed to the density of an equal amount of water. The percentage of moisture remaining in the gun cotton when it is packed into torpedoes varies between fifteen and twenty. So safe from explosion, unless detonated, is a brick of wet gun cotton that it may be placed upon hot coals. As the moisture dries off from the outside, the cotton flakes off and burns quietly. Perfectly dry gun cotton when confined in a strong case will explode with great violence if exposed to a temperature of about 320° Fahr.

Detonation, or the firing of explosives by intense shock, is a modern method, for until thirty years ago the application of heat was always used to bring about an explosion. It has now been discovered that detonating produces a more powerful effect than explosion by means of heat. In detonating the wet gun cotton in the torpedo heads, the primer of dry gun cotton which is used weighs only a pound or thereabout. It is placed in contact with the wet mass, which in a Whitehead torpedo consists usually of about 250 pounds. Then by means of a fuse and fulminate of mercury cap, a flame is shot through the disc of dry gun cotton. This explodes instantly, and with it the entire mass of wet cotton, producing tremendous results.

Coast Industrial Notes.

—Union, Or., citizens will build a railroad thence to the Seven Devils country.

—The collier Titania recently loaded 5800 tons of coal in sixteen and a half hours at Nanaimo, B. C.

—The Southern Pacific will shortly begin the extension of the Visalia, Cal., branch to Exeter, twelve miles east.

—Inman, Poulsen & Co.'s lumber raft, containing 5,000,000 feet, is on the way to San Francisco from the Columbia river.

—Twenty-six carloads of fruit were shipped East from Sacramento, Cal., last Tuesday, as against fifteen for the corresponding date last year.

—The Santa Cruz, Cal., Powder Co. last week shipped 120,000 pounds of powder to Manila, of which 100,000 is brown and the balance smokeless.

—A new line of railway is projected from the capital of Mexico, via Popotla, Tacuba, Atzapotzalco and Italnepantla, to Cuatro Caminos.

—The Spanish war is a big advertisement for the country. It will hasten the building of the Nicaragua canal and bring increased trade facilities.

—The proposed line of steamers to be operated between San Diego and Japan will be conducted by a corporation known as the California and Oriental Company.

—At Redlands, Cal., the Lugonia Water Co. has completed a pipe line eleven miles in length at a cost of $40,000. Two hundred and fifty carloads of pipe were used. Eighteen and twenty inch vitrified tile were used for the diverging lines.

—Prof. Haupt of the Nicaragua Canal Commission, before the Senate committee on the Nicaragua canal, expressed the opinion that the canal as proposed was entirely feasible, and placed the cost of construction at between $90,000,000 and $95,000,000.

—The Trail, B. C., smelter will be operated by electricity. Power will be brought from big plant at Bennington Falls. Six new roasters will be installed at the smelter. Forty-eight roast kilns will in time substitute the open roasts, and the fumes will be carried off by an immense stack.

—The agent of the Sierra Railway Co. has been in the vicinity of Summersville, Cal., and it is locally reported that the company, which originally intended Jamestown as its terminus, has, since work began on the Stockton and Tuolumne road, concluded to extend the line to Summersville.

—Solid trains of U. S. government war supplies are now arriving at San Francisco. Last Monday came a twelve-car trainload of projectiles for all sizes guns from 13-inch down. Some will be shipped to the Philippines, some remains in San Francisco, the remainder distributed to coast points.

—A. Smith of Los Angeles, has a Mexican concession to establish a line of steamers between Salina Cruz and Port San Jorge, on the coast of Sonora in the Gulf of California, and to build a line of railroad from San Jorge to the boundary line between the United States and Mexico near the mouth of the Colorado river.

—San Francisco men are prospecting for oil in Rincon canyon, near the dividing line of Santa Barbara and Ventura counties, Cal. Ten carloads of wrought iron pipe and machinery are being delivered at the wells from Carpenteria station, eight miles distant. Should the enterprise prove successful a refinery will be erected at Carpenteria.

—Thomas Marshall of Pittsburg gets the contract for the structural steel work of the new postoffice building at San Francisco. Bids were as follows: Stewart Iron Works, Cincinnati, $179,990; Ed T. Jones, San Francisco, $176,115.87; Risdon Iron & Locomotive Works, San Francisco, $174,875; San Francisco Building Co., San Francisco, $174,875; City Street Improvement Co., San Francisco, $166,000; I. G. Wagner, Milwaukee, Wis., $164,400; McGuire & Hall, New York, $166,498; Thomas Marshall, Pittsburg, $154,715. Marshall promises to have the work completed by March 1, 1899.

—Congress votes to annex the Hawaiian Islands. The population at the latest census was 109,000, of whom 31,000 were Hawaiians, 24,000 Japanese, 21,000 Chinese, 15,000 Portuguese, 5200 Americans, 2250 British and 1430 Germans. The receipts of the Government are about $2,000,000 annually, of which about one-third is gathered by tariff taxes; one-third by internal taxation, and one-third from miscellaneous sources. The U. S. exports to the islands are nearly $6,000,000 this year. The imports in 1896 were $6,063,000, of which about $4,000,000 came from the United States.

—The Manufacturers and Producers' Association of California have issued a directory of the leading manufacturers and producers of the State of California, with an alphabetical and classified list of members. A brief history of the association is also given, including a statement of what it has achieved and what it intends to accomplish, and directs deserved attention to the magnitude of the home market and manifest industrial requirements. The prefatory address concludes as follows: "The suppression of the convict goods calls for action of an earnest order, for this State-aided competition can destroy any industry. The agitation in the Eastern States against this undesirable source of manufacture will have the effect of forcing these goods to California, which has always been a convenient market for them. The Southwick bill now before Congress is aimed to confine the sale of prison-made merchandise to the State or Territory in which it is manufactured, and the vigorous support of this bill is incumbent on every friend of free labor in this State. With honest goods, just traffic conditions and freedom from State-aided competition California's future is beyond all question. The loyalty of our people to California industries must be steadily developed. The efforts of the Manufacturers and Producers' Association have received much criticism from the Eastern press, and have been misrepresented not seldom. There is nothing in the attitude of the association on this question to which the broadest-minded man can honestly take exception. It is the purpose and intention of the association to continue the battle for home industries despite all obstacles." The book merits wide circulation. A copy will be sent upon request addressed to Mr. L. R. Mead, secretary of the association, San Francisco, Cal.

—Discussing oil the Los Angeles, Cal., *Times* says: Shipments to San Francisco do not increase. Some of the large independent producers assign as a reason for this that the large manufacturers of San Francisco have always refused to enter into contracts for the delivery of oil until they could be thoroughly satisfied that the sellers were in a position to fill their contracts. Speaking in respect to this, one of the largest producers in the field said recently: "San Francisco manufacturers would be glad to take all the oil we could deliver to them at 80 cents a barrel f. o. b. Los Angeles, if we could guarantee them a year's supply under contract. But that," he went on to say, "is just where the difficulty lies, for there is not a single producer in the field who is in a position to make contracts of such duration."

—The offices of the Land Registrar and Receiver at Los Angeles, Cal., are busy over 1,000,000 acres land in Los Angeles, San Bernardino and Ventura counties which will be thrown open to location by the United States. This is the property affected by the suit brought by the United States against the Southern Pacific Company some years ago to quiet title. A decision was rendered against the railway corporation and restoration proceedings have now reached that stage where the Registrar of the Land Office is about to advertise the lands and open them up to claimants. A great amount of this country has been sold by the railroad to thousands of settlers, and now all these must prove their claims to the Registrar to prevent occupation by other applicants. A number of town sites have been laid out in this domain.

—The war revenue bill is now a law and all its provisions go into effect next Saturday. The coast will contribute about $20,000,000 annually. The bill is expected to produce $250,000,000 additional expense money for the Government. An expert roughly estimates the details of the increased collections as follows: Beer (increase) $35,000,000. Special tax on occupations, $4,000,000. Tobacco (increase), $25,000,000. Stamp taxes, schedule "A," stock transactions and stock exchange transactions, $26,000,000. Produce exchange transactions, $24,000,000. Documents and instruments, $8,000,000. Checks, drafts, etc., $22,000,000. Freight and express, $40,000,000. Telegraph and telephone messages, $10,000,000; insurance policies, etc., $4,000,000; mortgages, $4,000,000; miscellaneous instruments, $5,000,000; Schedule "B"—Proprietory articles: Medicine, etc., $23,000,000; merchandise, etc., $25,000,000; sugar and oil refining companies, $2,000,000; parlor and sleeping cars, $100,000; legacy and inheritance tax, $5,000,000; tea tax, $10,000,000. Total, $274,100,000.

—A pamphlet on the gold production of the Philippine islands, written by Frank Karuth, president of the Philippines Mineral Syndicate, fully corroborates recent statements of the MINING AND SCIENTIFIC PRESS regarding the gold resources of that region. Mr Karuth says he knows of no other part of the world, Alaska mines excepted, where pay ore is found within a few hundred yards of the anchorage of sea-going vessels. So far the fringe only of the auriferous formation has been touched. There is no brook that finds its way into the Pacific ocean whose sand and gravel do not at least pan the color of gold. Heavy nuggets are sometimes brought down from the mountains. Alluvial gold is also got in the island of Mindanao, especially in the districts of Surigao and Misimis, on its northern coast. Extensive deposits of copper ore in Luzon will probably prove remunerative when means of transport have been devised. The active operations of the syndicate are at present confined to a district in the eastern part of Luzon, and its concessions are scattered over an area of several hundred square miles.

Recent California Mining Incorporations.

Homestake G. M. Co., Tuolumne county; capital stock $250,000, subscribed $25,000; W. Burchett, L. W. McGlauflin, T. Poyzer, I. N. Chapman, W. R. Poyer.

Candalero M. Co.; capital stock $100,000, all subscribed; G. Treat, C. M. Chase, W. C. Pease, A. F. Morrison, R. P. Clement.

Anita M. & M. Co., Ontario; capital stock $480,000, subscribed $384,000; F. E. Trask, I. S. Miller, S. G. Vandergrift, R. C. P. Smith, H. T. Hughes, C. W. Allen, C. F. Allen.

White Oak Mining Co., San Francisco; capital stock, $20,000; W. S. Peters, F. F. Baker, H. A. Melvin, S. J. Conger, J. Henshaw.

The Sixes M. Co., Lakeport; capital stock $100,000, subscribed $85,000; W. P. Butler, C. M. Hammond, W. O. Edmands, R. S. Rodman, A. B. Rodman.

Recently Declared Mining Dividends.

Mammoth, Utah, $20,000; payable June 30.

Sacramento, Utah, $5000; payable June 28.

New Idria Quicksilver, Cal., 10 cents regular and 5 cents extra per share, $15,000; payable July 1.

Modoc, Colorado, 3 cents per share, $15,000; payable immediately.

Elkton Con. M. & M. Co., Cripple Creek, Colorado, monthly dividend 2 per cent, aggregating $556,860; June 20.

South Swansea, Utah, 5 cents per share, $7500; payable July 1.

Gold Coin, Colo., 1 cent per share, $10,000; June 25.

War Eagle, B. C., 1½ cents per share, $7500; payable July 15.

Napa Quicksilver, Cal., 10 cents regular and 10 cents extra per share, $20,000; payable July 1.

Ætna Quicksilver, Cal., 10 cents per share, $10,000; payable July 1.

Personal.

J. S. GOODWIN, a mine owner at You Bet, Cal., is in San Francisco.

J. JONES has resigned as Supt. Live Oak mine, Columbia Hill, Cal.

T. J. HOUGHTON is appointed Supt. Carson Creek mine, Robinsons, Cal.

E. H. WEBSTER becomes Supt. Grand Central mine, La Colorado, Mexico.

EX-GOV. MARKHAM is examining the Alice mine, Perris, Riverside county, Cal.

C. H. DUNTON, Supt. Larkin mine, Diamond Springs, Cal., is in San Francisco.

A. MCDONALD, Supt. Kanaka mine, Groveland, Cal., has returned from San Francisco.

R. E. LINDER has resumed the superintendency of the Red Dog gravel mine, You Bet, Cal.

HON. T. KEARNS, Park City, Utah, is examining mining property in Cripple Creek, Colo.

E. A. ABADIE, Gen. Mgr. Grand Central mine, La Colorado, Mexico, is in San Francisco en route East.

E. A. WILTSEE, San Francisco, consulting engineer London Exploration Co., has returned from Sonora, Cal.

JOSEPH LADUE, who left for the Klondike on the last steamer, takes the first quartz stamp mill into that region.

C. A. HAMILTON of San Francisco, who went to Mexico last December to investigate mining properties, has returned.

E. B. HENDRIE of the Hendrie & Bolthoff Manufacturing and Supply Co. of Denver, Colo., has returned from Europe.

EDWARD N. LINDSAY, who is in charge of the Grand Central M. Co.'s mines in Sonora, Mexico, has returned to San Francisco on sick leave.

SENATOR CHAPMAN, who was appointed a delegate to the Mining Congress at Salt Lake, has notified Gov. Budd of his inability to attend.

THE delegates appointed to the Mining Congress at Salt Lake by Kern Co., Cal., are J. Singleton, J. C. Quinn, C. C. Matthews, W. Bell, W. James.

SAM'L J. HENDY of the Joshua Hendy Machine Works, 40 Fremont street, San Francisco, returned last Wednesday from a business trip to Atlantic cities.

C. E. LOOSE, Mgr. Grand Central mine, Mammoth, Utah, and C. McCormick, are examining mining properties in Amador, Bodie and Calaveras counties, Cal.

CHAS. BUTTERS has arrived in Salt Lake City, Utah, from South Africa, en route to San Francisco. From California he goes on a business trip to San Salvador, C. A.

WALDEMAR LINDGREN has returned from Government duty in connection with timber cases in Arizona, and will leave next month for a season of geologic work near Hailey, Idaho.

THE Siskiyou county, Cal., Miners' Association appointed as delegates to the Mining Congress at Salt Lake B. F. Daggett, M. C. Beem, H. H. Hunter, A. J. Hughes, B. McGill.

MAYOR PHELAN of San Francisco has appointed as delegates to the International Mining Congress at Salt Lake City, Utah, J. J. Crawford, B. T. Lacy, John Daggett and J. F. Halloran.

THE Chamber of Commerce, San Francisco, has appointed delegates to the International Mining Congress at Salt Lake City J. W. Cross, T. L. Ford, W. C. Ralston, G. Stone, W. S. Keyes.

ALEXANDER FORSYTH, A. B., Professor of Metallurgy in the Missouri School of Mines, will occupy the chair of mining engineering and metallurgy in the State School of Mines of South Dakota.

C. B. FINLEY, for many years Mgr. of the Soddy Coal and Coke Co. of Tennessee, becomes Mgr. for the New York company that has purchased the Montana Coal and Coke Co.'s interest at Horr, Montana.

AT the annual meeting of the Pacific Coast Electrical Transmission Association in San Francisco this week, W. F. Pierce was elected president, C. M. Beal vice-president, Geo. P. Low secretary, Wm. Angus treasurer.

C. E. MILLS, who has been Supt. Detroit Copper Co.'s works at Morenci, Arizona, has resigned and gone to San Antonio, Texas, to join Roosevelt's rough riders. Mr. Mills was drawing a salary of several thousand dollars a year, which he abandoned simply because he wanted to fight for the flag.

WM. VAN SLOOTEN, Mem. Am. Inst. Mg. Engineers, New York City, who has been examining properties in Sierra Co., Cal., is on his way East, called thither by the death of Prof. Newberry, consulting engineer South American Development Co., operating in Ecuador. Mr. Van Slooten will return to California.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING JUNE 14, 1898.

605,466.—LOCK—A. H. Barnes, Reno, Nev.

605,547.—VAGINAL DILATOR—A. F. Holland, Berkeley, Cal.

605,738.—SUSPENDER CLASP.—J. V. Janin, Gold Basin, Wash.

605,728.—BICYCLE BRAKE—D. N. Le Ballister, Fort Bragg, Cal.

605,805.—ROTARY ENGINE—A. Lee, New Whatcom, Wash.

605,611.—SPRINKLING APPARATUS.—A. McGeoch, Oakland, Cal.

605,610.—WINDOW CLEANING SEAT—Muller & Hinman, S. F.

605,612.—BUSHING FOR BARRELS—W. C. Rawley, S. F.

605,615.—ORE STAMP—D. M. Smyth, Pasadena, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

WINDOW CLEANING SEAT.—C. A. Muller and Geo. Hinman, San Francisco, Cal. No. 605,610. Dated June 14, 1898. This invention relates to a movable seat or attachment for the outside of windows, which is adapted as a support for persons cleaning windows or performing any other work upon the outside. It consists essentially in a novel construction of the seat and a means for attaching and suspending it exterior to the window with no attachments passing to the inside. The base has metal strips secured across its ends, the inner ends of said strips being turned upward and slotted and adapted to engage and be held by screw eyes fixed in the window seat. Protecting rails extend along at a distance above the seat, with hook bars which engage with eyes or staples in the side of the building, and chains extend diagonally from said staples down to the outer angles of the seat, thus forming a protection to prevent the user from falling. The whole device is easily disengaged by unhooking it and turning the seat up until the slotted bars disengage from the hook eyes.

STREET SPRINKLING, IRRIGATION AND FIRE EXTINGUISHING SYSTEM.—A. McGeoch, Oakland, Cal. No. 605,611. Dated June 14, 1898. This invention relates to a water supply device especially designed to be used for sprinkling and irrigating purposes and extinguishing of fires. It consists of sections of pipes suitably perforated for sprinkling purposes, having the ends turnable in couplings, and a means whereby they may be so turned as to deliver the spray from the pipe at either side thereof and at any desired angle. The device may be fixed along the edges to sidewalks or gutters, or it may be fixed upon the apex of a roof with turnable directing devices to throw the spray to one side or the other and thus protect the roof in case of sparks from other fires.

BUSHING AND FAUCET FOR BARRELS.—Wm. C. Rawley, San Francisco, Cal., assignor to the American Faucet Co. of same place. No. 605,612. Dated June 14, 1898. This invention relates to the bushings and faucet attachments for barrels, casks and like devices. It consists essentially of a permanent bushing, which is fixed into the discharge opening in the containing vessel having an interior valve seat, a second seat formed within the bushing and opposed to the first-named valve seat with a space between the two, a valve movable between the two seats so as to close upon one when withdrawn from the other, and an annular shoulder formed around the inner surface of the removable cap, so as to close against and form a joint with the outer periphery of the inner valve seat. The valve has a tubular stem and openings made so that when it is withdrawn from the inner seat liquid can flow around the valve through openings adjacent thereto into the tubular stem, and thence escape through the faucet barrel, which is provided with lugs and adapted to engage and interlock with corresponding lugs in the outer end of the bushing. At the same time a collar fastened thereto fits a seat and prevents any leakage, while the inner end of the faucet barrel engages the inner end of the tubular valve stem, making a direct connection therefrom to the faucet, and serving, at the same time, to turn the valve to move it away from its seat.

CAN SIDE SEAM FUSING MACHINE.—Jules Gersant, Deal, and A. G. Buttifant, London, England. No. 605,605. Dated June 14, 1898. This invention relates to the class of machines known as can making machines, and the object is to provide a cheap, speedy and effective manner for side seaming the bodies of metal cans, boxes and other vessels and sealing the same. It consists essentially in the combination of a tiltable, cylindrical horn, having a longitudinal slot on its upper surface, perforations on each side, guides on the horn parallel with the slot, the perforated burner pipe inside the horn with tubes attached to the burner pipe and connected with a supply of inflammable vapor, means for tilting the horn, a cylindrical rack bar having a roller attached to its forward end and adapted to press over the seam of the can, and a presser connected with the roller so as to regulate its action on the seam. A mechanism is connected with the device and driving power by which the motion may be reversed.

Mining Summary.

CALIFORNIA.

Amador.

(Special Correspondence). — It is reported here that the Utica Co. at Angels talks of moving a plant to Plymouth, and that the old Plymouth property is to be reopened.

Plymouth, June 18th, '98.

Record: The Lincoln shaft has been opened about 80 feet, increased in size and retimbered to that depth. The new gallows' frame, hoist, boilers and engines, brought from the Lucile, have been put in position. The hoist is to be operated by steam. There has been no water encountered in the old shaft so far, and everyone seems to think that the property is drained to the depth of 500 feet by the Mahoney, which joins it, and which has been reopened since the Lucille was closed some years ago. If this be so, the work of reopening the property to the 500 level will advance very rapidly as soon as the new hoist is in operation. While cutting out to increase the size of the shaft, some good ore was taken out:

Republican: Sinking is progressing at the Amelia mine, Jackson, as fast as facilities will allow. Supt. Reese is driving for the 700-foot level, but water has interfered with the work to some extent.——At Mason & Griesbach's mine on Pioneer creek operations are proceeding. Gracey's mill is being fitted up preparatory to the crushing of 300 tons of choice ore. ——The Douglas mine, near Volcano, Supt. Triniman, is at work in the old shaft, which is about 400 feet deep. Twenty men are employed.——The Wieland mine, at Pine Grove, which for several months has been in a doubtful position, settled the delinquent April payment. The May payment will probably be paid soon.

Dispatch: Work at the Anita, Jackson, progresses; the shaft is now down nearly 700 feet. The rock is hard and work necessarily slow. ——Folger & Adams have bonded the Peeming land near the Zeila mine and will soon begin development work.

Butte.

Mercury: A large force is at work fluming Butte creek near Lovelocks.——The Best mine, near the forks of Butte, is running under the management of A. Jurgenson. ——Moody & Reily are running a tunnel on the Yellow Jacket mine, near Nevinsville. ——A strike is reported on the McCally property.——The old Dix mine is running a large force. B. Diller is Supt.——The Ohio mine is running with good results.——C. S. Quimby has sold his placer mine near Biggs to Corwin & Wheeler of Oakland.

Calaveras.

(Special Correspondence). — The California Exploration Co. has purchased the Thorpe mine near San Andreas.

The old Sheep Ranch mine is soon to be reopened. It is locally stated that the company will install electric power, securing it from the plant the Utica Co. contemplate putting in at Murphy's.

The Bonanza gravel mine at Murphy's has begun work which will be diligently pushed.

Murphy's, June 18th, '98.

Citizen: The California Exploration Co. discontinued operations on the Bund mine, near San Andreas, and Supt. Honnold expects word to assume charge of the Thorpe mine.——The new company incorporated to work the old Sheep Ranch mine has purchased the San Antone water ditch.——At the Gwin mine, near Mokelumne Hill, the old shaft is cleaned out to 1320 feet. So far the work in the old shaft has been very satisfactory. The new shaft is producing and the mill is running regularly. A full force is employed in each department.

Amador *Republican*: D. Gutmann has a bond on the Sheep Camp mine, which embraces several other mines and over 400 acres of timber land.——In the Harris mine, near Los Muertos, a strike of good ore is reported at a depth of 130 feet. The ledge is 8 feet wide.

Del Norte.

The Mettah Bar M. Co. operating on the Klamath river near Blue Lake has completed six miles of ditch and put in two giants. They intend putting in a hydraulic elevator preparatory to beginning work next autumn. They will have 240 feet pressure and 35 feet lift. The bar comprises four acres. The Supt. of the company is A. B. Campbell of San Jose.

El Dorado.

(Special Correspondence).—The Esperanza mine at Garden Valley milled about 1000 tons of ore that is said to have yielded $4 per ton. They pulled the pumps and shut down.

The Taylor mine has ceased operations awaiting the second installment on the purchase price. The pumps are in operation and the mine is kept clear of water.

The Union mine near El Dorado is running twenty stamps, twelve hours out of twenty-four.

The new 20-stamp mill at the Griffith Con., Diamond Springs, is to be completed August 1.

J. C. Diamond has cut the ore body on the 200 level, referred to in my last letter, and finds it to be 12 feet wide. It is good milling ore and some of it is quite rich.

The Gravel mine at Grizzly Flat runs ten stamps only twelve hours out of twenty-four because water is scarce.

I am reliably informed that the Gwin M. Co. have secured the old Havilah mine owned by Hendy of San Francisco and will reopen the property. It is at Nashville, about thirteen miles southwest of Placerville.

Senator Voorheis and Supt. Thomas were in Nashville examining, it is said, the Montezuma property and negotiating for additional ground.

The company operating the Newton gravel mine, six miles east of Placerville, failed to obtain favorable extension of bond, and finding their development work a loss they ceased operating. The property has a 10-stamp mill.

The Big Canyon mine operated by water from the Park Canal expects to be able to continue operations into July. The water supply is growing less throughout the county.

The Boulder mill near Shingle closed for the season on account of lack of water.

Development of mining properties is carried on in this vicinity to a greater extent than at any time in the history of the county.

Placerville, June 21st, '98.

Williams & Harpending are adding twenty stamps to the twenty in operation on the Union mine, near El Dorado.——Grizzly Flat mining interests are suffering from shortness of water.——The Eagle M. Co. at Grizzly are building a 10-stamp mill.

Georgetown *Gazette*: The Two Channel gravel mine is running and keeping the 10-stamp mill at work night and day.

Democrat: The mill at the German mine, near El Dorado, is running day and night, with twenty-two men employed and an abundance of pay ore.——They are still sinking on the Roberts mine near Lotus, and at a depth of 80 feet are getting out some high-grade ore, which is being shipped to the Selby Co.——Schiff & Limpinsel have struck a quartz ledge on Bear creek, in the Slate Mountain district, from 12 to 15 inches wide, that bids fair to prove valuable. From samples tested the yield was $100 to the ton.——A strike of rich value has been made at the Limpinsel mine near Placerville. At the 260-level a crosscut was run 20 feet, where the ledge was struck. The ore is highly sulphureted with gold plainly discernible. They have 10 feet of ledge matter, with the hanging wall yet to reach.

Gazette: The quartz locators on the Crane's Gulch placer patent, near Georgetown, will be forced to defend their claims in the courts.

Nugget: Work is progressing on the Boneset tunnel, Webber Creek district. The tunnel is in 160 feet. Hayward & Lane have a bond on the property.——The custom mill completed an eight-ton run on ore from the old Stuck Slager mine near Lotus. The result was satisfactory.——Root & Carey continue development at the Columbia mine near Cold Springs. A pumping plant has been put in and the shaft is down 90 feet.——At the Houx mine near Shingle Springs the shaft is over 100 feet deep.——On the Crown Point mine near Diamond Springs the shaft has reached 175 feet; a tunnel is being driven on the ledge that will connect with the shaft at a depth of 205 feet. Twenty-seven men are now employed.——A number of men were laid off at the Boulder mine near Shingle, owing to the shut down of the mill for lack of water. The sinking of the new shaft from the tunnel level is continued; it is down 205 feet. The work of breaking ore will be continued until the ore bins have been filled.——It is reported that the Unity mine near Granite Hill, which was closed down in November, will soon resume operations.——J. Melton contemplates installing either an electric or air-compressor plant on the South Fork of the American river to operate the Joe White mine. The plant will be about one mile above the mine.

Kern.

Los Angeles *Review*: The Black Hawk at Randsburg is working twenty men. The ore milled paid a good margin.——At the Eureka 2-stamp mill they cleaned up a run of sixteen tons of ore for the Sunshine, which produced $1950; six tons from the Santa Ana produced $735; twelve and three-fourths tons from the Kinyon produced $2165. They are milling thirty tons for the Butte that will average about $80 per ton. During the past thirty days they have milled about 200 tons of ore of the average value of $70 per ton, or $14,000. ——The Yellow Aster M. & M. Co. have sixty men working. They are preparing to ship to Barstow.

The Rand mine near Johannesburg has over 700 tons of ore in its bins and has begun shipping fifty tons a day to Barstow. Five stamps are still running at Garlock on Rand ore.

A big dump of refractory ore at Duval's mine beyond Garden Station in the Rademacher country will be shipped to Barstow. ——The engineers have completed the first survey of the route from Kern river to Randsburg for the establishment of the electric power line.——The Golden Rule mine near Randsburg, a new one, is showing up well. ——The Ophir mill at Cuddeback lake made a run of two and one-half tons of ore from the Santa Ana mine which turned out $140.

Mariposa.

(Special Correspondence).—At the Compromise (Marble Springs), the compressor has been started and air drills are now in use in the stope. The ore body in the new shoot, which is 4 feet in width and at the last clean-up milled about $15, is improving with depth and occasional streaks are encountered, which recall the bonanza days of the mine. The mill will shortly be started up again, being supplied with water pumped from the old workings.

The Virginia mine and mill have been closed by reason of short water supply. While a small amount of water remains in the storage reservoir the management reports that its use for condenser and compressor purposes has heated it to such a degree as seriously to interfere with amalgamation. The average of the ore milled during May and to date in June is understood to have been about $15, and the stopes on the lowest (400) level show considerable bodies of much higher grade rock. The closing of the property throws about thirty-five men out of employment till the fall rains.

The Tendron Company at Whitlocks have recently encountered a new body of good milling ore to the south of the present shoot in the lower workings.

At the Big Betsey, above Coulterville, twenty men are employed. Drifting is going on in both directions from the bottom of the shaft on the 200 level.

The Fresno company operating the Contention at Bull Creek has taken an extension of its bond for one year for further exploration.

The bond held by F. H. Hill on the Porter mine adjoining the Malvina and Tyro on the south has been allowed to lapse. Negotiations are in progress for re-bonding the property at an increased figure.

At the Mary Harrison mine of the Merced Company the station is being cut at the 700. Drifts from the old workings have been connected through to the shaft on the 500 and 600 levels, and the enlargement of the shaft to three-compartment size is completed. The winze has reached the 700 level and drifting toward the shaft has begun. The high grade streak of ore is again reported at this depth. The engine and boiler house at the Louisa shaft have been taken down, and together with the engine (one of the largest in the State), will be erected at the Mary. Water is scarce and all available men are laying a pipe line from the mill on Black creek to the mine. The distance is two miles and water will be pumped to supply the Mary Harrison till the fall rains set in.

The Louisiana mine and mill are operating as usual.

Preparations are under way for an unusual amount of river mining this season on account of anticipated low water.

Mariposa, Cal., June 20th, 1898.

Mono.

Chronicle: Supt. M. W. Nelson expects to start up work at the Jordan mines, the Goleta, Montecito and Sterling, near Lundy, about the 24th. The mill will be started for a permanent run, as Supt. Nelson is now assured the ores of these mines can be worked with satisfactory results.

Napa.

The Napa Consolidated Quicksilver Company issues the following statement for three months to June 1st: Gross receipts, $57,600; charges, $32,649; net, $24,951; dividend, $20,000; surplus, $4,951.

Ætna, four months to June 1st: Gross, $39,600; charges, $26,827; net, $12,773; dividend, $10,000; surplus, $2,773.

Nevada.

Drifting north and south on the ledge from the 1200-foot level at the Mountaineer mine, near Nevada City, is in progress. The ledge is about 6 feet wide.——At the Chapman Ranch mine the 5-stamp mill is kept busy on good ore.

The old Ben Franklin group has been bonded to Boston men, who will begin development. It is one of the oldest quartz mines in the State, but has never been worked below water level. It has produced nearly a quarter of a million dollars.——Grading for the 300 H. P. compressed air plant, to supply the Central mines with power, has been commenced, and within the next four months Supt. Foote expects the plant to be in operation. On future developments will depend whether or not a new hoisting and pumping plant, as well, will be erected at the Central. The shaft is down 530 feet.——The Massachusetts Hill shaft is down 1400 feet on the incline; sinking continues. There are about 200 men employed on day's pay and contract, who keep twenty stamps of the North Star mill in operation.

Union: D. Voss will reopen the old Lecompton quartz mine near Nevada City. The old shaft will be cleaned out and sunk a few hundred feet deeper.

Herald: The Eagle Bird mine, at Maybert, is working a small force this month, water being scarce.

Transcript: W. T. Phipps, Mgr. State Anti Debris Association, has lodged complaint with the U. S. Debris Commission against the Kate Hayes M. Co. and others.

Union: The new 10-stamp mill on the Gaston Ridge property near Graniteville will be completed, says Supt. Harmon, about July 10. He will then run twenty stamps day and night.

Placer.

The statement of the Pioneer M. Co. for May is as follows:

Tons rock crushed	630
Men employed	50
Average value rock	$13.77
Value gold bars	8,676
Pay roll	4,238
Bills	1,226
Total expenses	5,465
Net earnings	3,211

Water at the mill has been very short all the month; some of the time ten stamps only were running, and they very slowly. The construction of the dam and flume is progressing very satisfactorily, the low water in the river offering a favorable opportunity for doing the work. When this dam is completed a regular monthly product is assured, and it is further expected that sufficient power will be obtained to run twenty more stamps, and when these expectations are realized the stamps will be added and the product should be doubled. This completes the twelve months during which the management has reported monthly operations. During this period the gross earnings were $142,995; 9051 tons of rock were crushed, which averaged $15 80 per ton; $25,000 was paid in dividends and $47,069 carried to surplus account. The company earned 7.2 per cent on its $1,000,000 stock. Dividends are now being delared at the annual rate of 5 per cent.

Leader: It is locally reported that the Van Avery mine at Blue Canyon, which had been bonded by a Des Moine, Ia., company, has been bought by that company and work of increasing milling facilities will be begun shortly.

Herald: Senator Chapman is rushing work at the Golden Rule, near Auburn.——A good strike is reported from the Jubilee mine at a depth of 100 feet.——J. Malmberg is keeping his 5-stamp mill going steadily.——The hydraulic mines at Gold Run have closed down for the season.

Sentinel: The tunnel at the Azelea mine, Blue Canyon, is in 950 feet and the quartz is improving.

Plumas.

The *Independent* reports the discovery of a bituminous coal vein near Genesee Valley.

National-Bulletin: J. E. Remick of Taylorsville has begun hauling quartz from the Lucky S. mine to the mill for a crushing.——Thomas & Flanagan have a good quartz prospect at the Bell mine, near Quincy. They are said to have a ledge of from 3 to 4 feet. The ore is being hauled to the Wormley arrastra.——Mr. Allen is doing development work on the Bushman quartz mine, near Butterfly. It is said that a mill will soon be erected.——The late rains have increased the supply of water at the Bean Hill and Plumas Imperial hydraulic mines. A small force is employed at each mine.

Riverside.

Further work on the Leon mine has been postponed.——The Iron Chief employs sixty men in development and construction work. The shaft is down 265 feet. The mill and cyanide plant will have a capacity of sixty tons per day.

San Benito.

The New Idria Quicksilver Company issues the following statement for four months to June 1st: Gross, $61,200; charges, $22,850; net $38,350; dividend, $15,000; surplus, $23,350.

San Bernardino.

Development continues on the properties on which tin was discovered in Holcomb valley. ——The dry year is profitable to the men working dry washers.——Matheson & McComb continue development on their copper property. They are said to have a fair-sized vein.——At Virginia Dale M. Furguson is putting up a 5-stamp mill, and will mill ore from his White Star and Standard mines, from which he has 500 tons on the dump. The work on these mines consists of a 1400-foot tunnel and a 140-foot shaft. They have a 4-foot ledge of good grade rock. St. German & Coolidge in the Ivanhoe mine have a shaft 130 feet deep and 200 tons of good rock on the dump. The Evening Star mine has out about 100 tons of good ore.

Los Angeles *Express*: The new reduction works at Barstow have started up and 200 tons of ore run through the mills. It is expected that it will take about a week to get everything running in proper shape, when the works will be able to take care of all ore consigned to them. Five cars of ore were shipped in from Randsburg. It is believed there will be no difficulty furnishing ore to keep the works running at full capacity.

San Diego.

(Special Correspondence).—A strike of free-milling ore is reported in the mine of R. Gardner, between Julian and Stonewall.

In the Washington mine, near Julian, a valuable ore chute has been encountered, after months of patient work.

The Ranchita at Banner reports another and still richer discovery. It has for a long time been a steady producer.

The Helvetia, between Julian and Banner, is attached by the miners, who demand pay for their services.

In the Mountain View, near Cuyamaca, the free ore chute continues better as depth is gained, and recently a sulphuret ore has come in nearly alongside the free ore but not allied with it. The value of the sulphurets has not yet been ascertained.

Lawyer Holland made a 100-ton crushing of ore from his Eleveda mine by the Ranchita mill, which gave him a twenty-pound brick—a value of over $5000.

The Schilling Ranche mine, patented, between Stonewall and Julian, has been bonded for ninety days for $10,000. Eastern capital is investigating. The ledge varies between 16 inches and 10 feet in width. Some good assay returns have been made.

San Diego, June 17th, '98.

The Richmond, near Julian, has started with a full force and has 1400 tons of ore.—— The Bailey Bros. have their ten-stamp mill running.——The Ventura M. Co. has about thirty tons of ore on the dump.

Shasta.

A ledge has been found near Muletown that assays well in gold and silver and 37 per cent copper.

Temporary injunction is asked in the United States Circuit Court in the name of the United States to restrain the Mountain Copper Co., Ltd, from roasting their copper ores in the open air near Keswick, the suit being for the preservation of the timber. The complaint claims that the smoke can be condensed and innocuous to vegetation.

Courier: G. C. Carson and others have purchased the La Plant mine near Keswick and put men at taking out ore.——The developing work on the copper prospects on Stillwater is being prosecuted and the outlook is encouraging. In one of the shafts high grade black sulphide of copper ore has been penetrated. ——Copper ore was discovered on the claims on Stillwater of Bryan & Dittmar.——W. W. Wright has purchased the Brunswick mine near French Gulch for $30,000. The property has a 4-stamp mill, to which twenty stamps are to be added.

Siskiyou.

In the Pitz mine at Oro Fino a small-sized ledge has been found that assays from $75 per ton upwards.

The American Bar M. Co. near Hornbrook are moving machinery to begin work on a fourth pit. They have already worked out three large pits this season.

At Oak Bar is the largest wingdam on the Klamath river. The length is 12 feet by 200 feet wide. The dip wheel is 24 feet high. The size of the flume is 14 and 16-inch sides and 20-inch bottoms, and has a length of 1400 feet. The length of pump shaft is 260 feet and the size of the pump is 6x24, 32 feet long and capable of hoisting 60 miner's inches of water per minute.——The Blue Gravel mine

near Yreka realizes from $300 to $400 daily, the expense of running the mine is $100 per day.

Journal: H. J. Barton has built a wingdam, with head and foot dams, near Oak Bar, covering a distance of 1400 feet in length. A claim worked out in pioneer days by Kleaver & Co., near by, yielded over $80,000. The Distlehorst & Barton dredge is running day and night at mouth of Horse creek, Klamath river, with excellent success lately. Over $500 was taken out last week, and the operators feel confident of doing still better as the claim is more fully opened in the pay channel. ——The Eastern company interested in the Yreka creek mining enterprise has men at work with apparatus for prospecting the ground in the vicinity of Hawkinsville, to continue up to Yreka, at a distance of 200 yards apart. The machinery is of the boring style. If everything proves satisfactory dredging apparatus will be introduced in working the creek and taking the ground bonded for mining purposes from below Hawkinsville to the northern line of Yreka Hickey Bros. purchased a half interest in the Esmerelda quartz mine near Sawyer's Bar for $2000. There is said to be a 4-foot wide vein in this property that averages from $75 to $100 gold per ton.

Sierra.

Fifteen tons of machinery for the Gold Bluff quartz mine near Downieville are on the way to the property.—F. G. Lowe had seven tons of ore crushed from his mine near Pike City which yielded $136 gold and $20 a ton in sulphurets. The ledge is 12 inches thick.

The Grass Valley *Union* says work will be commenced immediately installing compressed air plant at the Plumbago mine. The plant will be located on the middle Yuba river, about 4000 feet below the mine. The air will be transmitted to and reheated at the mine. It is estimated that it will cost in the neighborhood of $10,000 to install the plant. The Supt. of the mine is M. W. Mather, Alleghany P. O., Cal.

Trinity.

Craft & Flake shipped $1200 gold bullion from their quartz claim on North Fork of Coffee creek.——The McKinley M. & M. Co. have seven men at work on a quartz property near Trinity Center. They expect to start crushing ore in thirty days.

Reporter: At the Cinnabar shaft and tunnel 250 men are reported at work and fifty are to be added July 1st.——At New River work has been resumed on the Grover Cleveland mine.

Tuolumne.

In the Arbona mine, Tuttletown, the shaft is 230 feet, and drifts on two levels have a total of 353 feet. The company contemplates sinking 1000 feet. The vein is 4 feet wide. The quartz contains 5 per cent sulphurets assaying $40 per ton. The ore is said to run from $12 to $15 per ton.——The Santa Ysabel at Quartz mountain has two 300-foot vertical and one 600-foot incline shafts. The veins run from 5 to 15 feet. There is a 20-stamp mill on the property run by electricity.——B. M. Ford has bonded to Stockton capitalists 120 acres near Quartz mountain for $20,000. Development work will begin in August.

Union Democrat: At the Grizzly, near Carters, general development work is being done, and indications point to a prosperous future. On the 280-foot level a drift is being driven for the shaft of the old workings. The work of raising ore was commenced last week, and the bins are full, with much more blocked out. The new 20-stamp mill made its initial run. W. Sharwood is Supt. The mill has a crushing capacity of 1500 tons per month.——Supt. E. D. Dell has a small force at work on the Belleview, near Sonora. The depth reached is 760 feet.——The Gerrymander, near Sonora, is drifting on the 100 level and is in good ore.

NEVADA.

Pumping was resumed at the Chainman mine and the largest stream of water ever raised from that mine is coming down the canyon. The mill began the crushing of Jupiter ore, and when this has been disposed of it is expected that work will be resumed in the Chainman.

It is said the Gold Creek Company's placer mines at Gold Creek have again been closed down.

At the De Lamar mine 300 tons of ore daily pass through the mill. The steam wagon, which has experienced some trouble getting through the sand, will have its tires enlarged to 16 inches across the arc.

The White Pine *News* says that the sale has been made of the Star and Grey Eagle mines at Cherry Creek by the Florence M. Co. and A. C. Cleveland to the Adelaide Star mines, limited, a corporation whose office is in Glasgow, Scotland, for $182,250. A large mill is contemplated.——Developments in the North Mountain Co.'s mines at Cherry Creek are uncovering good bodies of high grade gold quartz.——The Independence and Elra mines at Tuscarora have been consolidated and will hereafter be worked under one management.

Pioche *Record*: The operations of the new company at Ely have not progressed beyond the trial stage. The ore is low grade, $12 rock being regarded as fair.

OREGON.

Work on the River Junction placer mines of the Co-operative M. Co., in Jackson county, Watkins district, is developing satisfactorily. At bedrock on the channel they are said to be getting 14 cents to the pan.

A. Underwood of San Francisco has purchased the Hamersly mine near Wimer and begun work.

At Baker City ore is being delivered from the Collateral mine to the mill on the Virtue mine. If the first cleanup shows as well as the assays work will be continued.——The cyanide process used by the Oregon Gold Extraction Co.'s plant at Ashland is giving satisfaction and the company will extend its plant. They have worked only a small portion of the tailings of the Ashland quartz mill.

Grants Pass *Journal*: Great things are promised from the development of the lodes in the Mt. Reuben district, near Grants Pass. The Gold Bug mine, in which it is said a million dollars' worth of ore has been exposed, will shortly pass into the hands of Senator Jones and associates of Nevada. These men will erect two 20-stamp mills and 200 men will be given employment within six months.

Ashland *Tidings*: The Ashland mine shipped a carload of ore and one of concentrates to the smelter. The mine also made a cleanup of 160 tons with satisfactory results.——Senator Jones it is said will build a 20-stamp mill on his mine in Mt. Reuben district.

WASHINGTON.

The Indian appropriation bill now pending on the conference report retains an amendment making the mineral lands in the Colville Indian reservation subject to entry under the mineral laws, the lands allotted to Indians or used by the Government for any purpose or by any school being, however, exempt. This amendment applies to the southern half of the reservation, and another amendment retained provides that the lands allotted to Indians or used by the Government or any school on the northern half shall not be subject to entry. The right is granted to cut timber for mining or domestic purposes on the allotted lands of the northern half, and the Secretary of the Interior is directed to compel allotments on that half on the surveyed and unsurveyed portions.

The Republic mine at Republic is reported bonded to a British-American corporation for $3,000,000.

Work will shortly be resumed on the Sunday mine at Meyer's Falls, a recent shipment of eight tons yielding good returns.——A strike is reported on the Bryan & Sewall at Republic of a body of ore 25 inches wide containing silver, lead and copper.——The Supt. of the Quilp let a contract for 100 feet of drift to be run.——Twenty bids were submitted for the contract, ranging from $5 to $8 per foot.

At Curlew lake work is shortly to be resumed on the Lame Foot group, owned by J. Goetz and others of Spokane.——The Republic mill is to install additional crushing machinery.

It is reported that the Chloride and Rattler properties, near Fruitlands, have commenced shipping.——The Double Standard mine at Northport is again being worked.——C. Knutson of the Great Republic mine at Northport will put $10,000 in this property in pumps and the necessary machinery for the further prosecution of development.

Spokesman-Review: A 12-foot wide ledge has been found in the Red Top mine, near Boundary. The ore carries gray copper chlorides and galena.

BRITISH COLUMBIA.

Naden & Hallett have sold the Fourth of July claim in Greenwood to the Old Ironsides Co. for $3000.——Twelve hundred and thirteen tons of ore were received at the Trail smelter during the past week from the Rossland mines. The War Eagle sent 976, Iron Mask 80, Monte Cristo 125 and Center Star 32.

Rossland *Miner*: The Golden Gate and the Jennie Lind, two copper properties near Hall's Siding, in the Ymir district, have been sold to F. L. Mercer for $7000 cash. He also purchased the Dodo, in the same country, for $1700.——The machinery for the compressor plant for the Noble Five, in the Slocan, will be installed at once.——A force has been put on at the Canadian group and work will be pushed.——The Payne shipments have been curtailed during the last ten days on account of an accident on the tram.——D. G. Eaton returned to Nelson from San Francisco, where he went with a shipment of ore from the Silver Cup mine. It consisted of 350 tons and was consigned to the Selby smelter. The returns were favorable, the ore averaging 200 ounces of silver and $12 in gold to the ton. The Silver Cup is being operated by the Sunshine M. Co., commonly called the Horne-Payne syndicate. Since last September about 800 tons of ore have been mined and sacked, but only 350 tons of this was shipped, as it all had to be hauled by teams or rawhided twenty-four miles to Thompson's Landing, on the Arrow lakes.——The Silver Bell shows a lead 10 feet wide assaying $41 in gold and thirty ounces silver.

Over 100 men are working in Greenwood and Wellington camps.——It is reported that the Royal Banner mineral claim in Summit camp has been bonded to an English company for $30,000. Of this amount $1000 has been paid in cash.

Rossland *Miner*: The Corbin block of Virginia stock has been sold to the Mackay combination, which now holds control of the property. The sale included 122,595 shares at nearly 36 cents a share, amounting to over $43,000. The sale was cash. The same company also holds the control in the Monte Cristo property.——From Sandon, between August 1st of last year and May 27th last, were shipped 22,993 tons of Slocan ore. Of this the Payne mine accounted for 10,010 tons, the Ruth with 5374, the Slocan Star 3247, the Idaho 1864, the Last Chance 1384 and the Reco 1128 tons.——The Channe M. Co. at Fairview has received returns from trial shipments made to Liverpool as follows: Tangier mine, ten tons treated, gave silver, 94.39 ozs. per ton; gold, 0.339 ozs.; copper, 5 60 per cent net; lead, 28¾ per cent. Waverley mine, further shipment of seven tons, yielded gold, 0.163 ozs. per ton; silver, 21.88 ozs.; lead, 26¼ per cent; copper, 5.06 per cent net. Two cars of seventeen tons each sent to the smelter gave the following returns: First car, gold 0.10 per ton; silver, 59 ozs.; copper, none; lead, 17.2 per cent. Second car, gold 0.16 per ton; silver, 593 ozs.; copper, none; lead, 19.2 per cent.

News-Advertiser: In Barkerville district, Cariboo, the starting of the large hydraulic elevator of the Cariboo Goldfields Co. was attended with success. The plant is on the old Marysvale ground. The lift is 90 feet; the pressure is 650 feet. There are many places in Cariboo situated to the Goldfields property, and the success of this method of working the deep ground will be of great benefit to the district.

ALASKA.

The Alaska-Treadwell mine reports for May as follows: Ore reduced, 22,266 tons; sulphurets, 314 tons, latter yielding $11,968; bullion produced, $42,389; gross expenses not given; average ore, $1.90 per ton.

The Alaska-Mexican mine for May reports as follows: Ore reduced, 12,956 tons; sulphurets, 347 tons, latter yielding $11,981; total bullion, $40,992; gross expenses, $24,249; average ore, $3.16 per ton. The report of the same mine for the fiscal month of June was as follows: Ore reduced, 13,931 tons; sulphurets, 262 tons, latter yielding $10,947; bullion produced, $40,051; gross expenses, $20,332; average ore, $2.88 per ton.

The first mile of track of the first railway in Alaska was laid through Skaguay on the 22nd inst.

UTAH.

Park City was almost destroyed by fire last Sunday. The loss aggregates $750,000. The entire business portion of the town was consumed.

Assays from the Star, in Pine canyon, show sixteen ounces silver and $7.40 in gold.——From Alta shipments from the City Rock and Grizzly were made to the smelter.——A shipment of cyanides from the Northern Light consisted of 106 pounds, from which $501.31 was derived.——At the Nigger Baby the vein has widened to 18 inches and the values of the ore run from $28 to $35, chiefly silver.——Samples of ore from the Copper King mine at Alta assay from 10 to 40 per cent copper, and active work will be prosecuted throughout the season.——The Richmond and Theresa, in the same camp, have been leased by men who will begin work at once.——A lease has been closed on the Read & Benson ground which has been productive of much ore in former years.——Eight cars of silver and lead ore were shipped from the Niagara at Bingham.——The first shipment of ore has been made from the Bemis lease on the Spanish at Bingham. It carries silver and lead, with a fractional amount in gold.——A carload of ore from the West Argent at Stockton shows forty-five ounces silver and 45 per cent lead.——The new strike in the Hercules averages thirty-four ounces silver and 50 per cent copper.

The report of the South Swansea at Silver City this month shows the property in good condition. A trainload of ore is being prepared for the market, while new depths are being prospected; the ore, it is said, maintains a uniform grade and affords a good margin throughout the various levels.——In the Grand Central, at Mammoth, ore bodies are increasing and everything shows a steady increase in the output. The company is negotiating for an electric plant and it will be installed as soon as the company decides at what point the sinking of the new shaft will begin.——At the Ajax mine work on the shaft is progressing with satisfactory results. It has reached 65 feet below the 400-foot level. Meanwhile the management is marketing sufficient ore to meet the requirements of the pay-roll.——The mill on the property of the Ophir Hill Con. M. Co. at Ophir has started up and will continue as far into the season as the volume of water will permit. The starting up of the plant provides employment for thirty-five men between the mine and mill, through which 100 tons will be put daily, the concentrates going to the smelter.——The Marsac mill at Park City is working the tailings of the Ontario mine. They afford a good margin, and in the opinion of many the ore bodies in the mine can be made to respond with a dividend any time the company decides to call upon them.

The good returns of the Silver King under the management of T. Kearns, are approximating those of the productive days of the Ontario and Daly, while at the Anchor Mgr. Keith is accomplishing results far ahead of any that have been hitherto recorded.——At Fish Springs the Utah is taking out ore.——A strike of lead ore is reported from the Addie Bell.——The Galen M. Co. made a shipment of high grade silver and lead ore.

At Lion Hill the initial shipment of high-grade ore from the Columbia has been made.

The *Miner* reports the shipment from Tintic of sixty-two cars of ore, ten cars of concentrates and thirteen bars of bullion.——Samples of ore from the Orient in West Tintic from a new strike show fifty-six ounces silver, 20 per cent lead and $13 in gold per ton.

Tribune: Unwilling to meet the advance in treatment charges Pres. Beck of the Bullion-Beck M. Co. at Eureka says that the marketing of ores from the property will be stopped and the output held at the mine until a desirable contract can be entered into. The smelters, he says, are making exactions to which he cannot consent, and while he would like to see the mine continue among the shippers, he is not willing to have it do so at a sacrifice to the stockholders.

Of the Bullion-Beck he says it has rarely looked as well as at present. The ore bodies some time ago uncovered in the winze are large, and when connections are made between them and the 1300-foot level, will be raised at a greatly reduced cost.——Samples of ore from the Homestake at Silver City show a heavy percentage of copper. The ore occurs in streaks at a depth of 500 feet in the shaft.

Tribune: That the directors of the Mercur M. Co. will at their next meeting take definite steps toward the erection of the long-projected mill at the mine has been given out as a fact. It is said the capacity of the projected plant will be not less than 300 tons daily with which to start, while provision will be made in the construction of the foundation for at least double that tankage.

Mercur *Mercury*: Col. Heffron, who secured a short-time bond on the South Daisy a few weeks ago, has made the first shipment, aggregating $11,000. He has men at work on the property and good results are being obtained.——The owners of the Mercur mine were $12,000 in debt before they adopted the cyanide process. Since then they have a large sum in dividends.

IDAHO.

(Special Correspondence).—The Silver City district is south of the Snake river, in Owyhee county, seventy-five miles south of Boise, at an altitude of about 6300 feet above sea level. The mines here were discovered in 1863 and in early days Silver City was the principal point on the pioneer trail between Boise and Winnemucca. The town itself is situated on Jordan creek, between War Eagle and Florida mountains. The discovery and development of the noted mines on these two mountains and the growth of the town are closely interwoven with the history of southern Idaho.

The Boise, Nampa & Owyhee Railroad has been built within the past year from Nampa, on the Oregon Short Line, to Guffey, on the Snake river. From Guffey to Silver City and DeLamar the old stage conveyances and freight wagons are still required.

The oldest property in the camp is the Poorman, which is on War Eagle mountain, and was located in 1865. It comprises eighteen claims and is credited with a production of $6,000,000. In 1866 it produced ore which milled an average of $229 per ton. The cost of production was then $66 per ton. The property was practically idle from 1875 to 1888. From the latter date to the present time it has been in the hands of and worked by a London company. A reorganization was effected in 1895 and a 10-stamp mill built, with a one-mile tramway from the mine to the mill. Present workings extend 250 feet below the main level and 900 feet below the apex of the vein. The old workings, above the main level, are practically abandoned. The principal vein is cut by a crosscut which runs from the main level on a parallel vein. The length of the main tunnel is 2000 feet. They are now in a body of ore which is being milled at the rate of ten tons a day. The mill includes stamps and screens and Pelatan-Clerici treatment vats. The ore is a gold-bearing quartz, with some silver. Richard H. Britt is Supt. and Frederic Irwin consulting engineer.

The Trade Dollar, which has been under the superintendence of James Hutchinson since May, 1894, is on the south side of Florida mountain and has three miles of trackage, five miles of tunnels, drifts and levels, connecting with the Idaho & Pittsburg tunnel on the opposite side of the mountain. It is equipped with a 10-stamp pan amalgamation mill, which ran 359 days in 1897, crushing 8975 tons of ore in that time, which ran $60 per ton, yielding $538,500. Besides this product, ores of the value of $196,500 were shipped direct to the smelters, making a gross output for 1897 of $735,000, the net profits, in round numbers, being $420,000. Smelter shipments thus far in 1898 have given very high returns. As an example, one shipment of 23,921 pounds brought $44,185; a shipment of 25,412 pounds yielded $24,648; another of 24,797 pounds brought $24,225. The shipments to the smelters average two cars per month. The mill is crushing an average of twenty-five tons per day. The product is about one-third gold and two-thirds silver. The Trade Dollar is the property of Pittsburg capitalists.

The Idaho & Pittsburg M. & M. Co. own and operate the group of properties on the north side of Florida mountain locally known as the Black Jack group, whose claims end line with those of the Trade Dollar, the underground workings of the two properties connecting. This property also belongs to Pittsburg parties—not the same, however, as those who control the Trade Dollar. John Irwin Jr. is president, Edwin Bindley vice-president, James MacKay treasurer, Lloyd L. Little secretary and Frederic Irwin Supt. The Black Jack was opened in 1890 by an 800-foot crosscut to the ore ledge. From this point a drift on the ledge extends 1500 feet. A vertical shaft is down 236 feet from the twelfth level, crosscuts being run at 100-foot stations. The main two-compartment shaft follows the hanging wall. The development includes 2000 feet of crosscuts, 1400 feet of levels, and 4000 feet of drifting on the ledge. The company has on the ground a 10-stamp, wet crushing, combination mill, with four vanners, eight pans and four settlers. The mill averaged twenty-eight tons per day for 1897, operating 360 days. It has been in continuous operation for five years. Sixty per cent of the product is saved in the concentrates, the balance of the saving being from the amalgam pans. The ore is a medium-hard quartz, carrying sulphide of silver and free gold. The ore runs from $30 to $40 per ton, and it is stated over 90 per cent of the values are saved.

The Cumberland group, on War Eagle mountain, owned by James Shaw, is being worked under bond and lease to Sonneman & Branscombe of Spokane, who also have a lease on a mill belonging to Scales & Wagner. The Cumberland is on the opposite side of the mountain from the Poorman. It is developed by a shaft 250 feet deep and 700 feet of levels. The hoist is operated by gasoline. The ores are a gold and silver-bearing quartz, running in the ratio of one ounce gold to five ounces silver, the gold being free. The mill is being equipped with concentrators and amalgam pans, and is in charge of Stanley A. Easton.

Dewey, the midway point between Silver City and DeLamar, is the headquarters of the Florida M. & M. Co., the promotion of Col. W. H. Dewey, who erected there and equipped a fine hotel, some business buildings and an excellent 20-stamp mill. WASCOTT.

Silver City, Idaho, June 7th, '98.

The Empire at Silver City is being unwatered. It is expected that about twenty days will be required to clear the mine to the

sixth level, where development work will be prosecuted.

The Camas No. 2 mill at Hailey is running on Golden Star ore. Only ten stamps will be run for a while. If the result is satisfactory the mill will be run to its full capacity.——Most of the machinery for the Wardner M. Co.'s use on the Nabob is on the ground. As soon as the hoist is in working order there will be considerable ore taken out and some may be shipped, although the main purpose at present is to do development work on the property, which is held under bond.

The April report of Mgr. D. B. Huntley, of the De Lamar M. Co., shows: Fine gold produced at mill, $16,179.03; fine silver produced at mill, $755.86; a total of $16,934 89. Shipping ore produced, $2000; quicksilver produced in cleaning up mill, $3000; miscellaneous, $75. The total receipts were $22,009.89. The total operating expenses were $21,226.36. The profit was $783 53.

The shaft in the Standard at Wallace is down over 150 feet, and the 200-foot level will be reached early in July. The shipments of ore are gradually increasing, 450 tons a day being shipped to the concentrator. A couple of months ago the daily shipment was but 300 tons. The Standard is said to have paid $80,000 in profits last month.

The owners of the Uncle Sam will resume work in a short time. In addition to gold, the Uncle Sam carries a large per cent of silver, mostly black sulphurets, which assays $700.

Boise *Statesman*: Dr. Law is pleased with his placer property at Lardo. A ditch to carry 3000 inches of water is being constructed, and with this flow the property can be worked at a good profit for many years.

Florence *Miner*: The last samples of ore taken from the Candaleria mine gave a mill run of $35 per ton. The ledge is opened up the entire length of the claim; there are two shafts on a 4-foot wide ledge of pay ore, and 200 tons of ore are on the dumps. A milling plant will be placed on this property this summer and the mine will be systematically developed. The owner is R. J. McLean.——The Banner mine will have a capacity of about 60 tons per day; the stope at present shows 16 feet of milling ore, and the shaft is in good ore. A new stope will be started and sinking will be continued.——The new discovery on the Double Standard is improving as work continues. It is said that a hoist will be placed on the ground and active sinking begun soon.

Silver City *Avalanche*: The test run of 50 tons of Poorman ore gave results that were satisfactory to the manager. The plant is running at its fullest capacity, 10 tons daily, and is said to be saving the values very closely. The Poorman is now on the list of producers.

MONTANA.

J. H. Conrad has sold his interest in the coal and coke properties at Horr to a New York company for $780,000 cash. The property comprises the Horr coke plant and 6000 acres of coal lands. S. H. Stern, a New York attorney, came west and consummated the deal. Some of the most famous experts in the country examined the mines and reported on them before the New Yorkers decided to go into the deal. The purchasers announce that new appliances will be introduced and the plant will produce the best grade of coke.

At the Overland and Bonanza Chief near Clancy work is progressing, the large pump at the Overland, it is said, proving itself of sufficient capacity to handle the water. Extensive improvements are being made at both these mines.——The work of getting ready to operate the gold dredge at Montana City is progressing and the indications are that they will be ready to start up in a short time. At McCauley's bar, on the Prickly Pear, gold is being cleaned up monthly as usual, and along the McClellan and its tributaries work is in progress in several fair diggings.

A strike of 2½ feet of good silver ore in the Silver Chief property, which has been under development by the Hope M. Co. at Tower for a number of years, was made recently.

Secretary De Mars of the Eva May informs the Basin *Progress* that the necessary changes will soon be made in the concentrator at the mine, and everything is being put in shape to commence shipping the first-class ore to the smelters.

With the exception of the Montana Ore Purchasing Co., all the mining companies of Silver Bow county have reported their earnings for 1897 to the county assessor. The Anaconda Co. heads the list, but its production for the year is not so large as it was during 1896, there being a difference of about $360,000. The total shows a falling off of over $200,000, but the Butte & Boston, Lexington and Moulton companies report no net product for the year. The report shows the following production:

Anaconda	$4,016,350
Boston & Montana	2,882,955
Parrot	472,750
Colusa-Parrot	37 175
Alice	6,400
P. A. Largey estate	92,800
J. V. Murray	600
Total reported	$7,507,875

The Dernier claim, near Butte, has been sold by a decree of Court for $51,000. The purchaser was T. M. Hodgens of the State Savings Bank for outside parties.——Sinking is being prosecuted at the Leonard shaft of the Boston & Montana. The station at the 900 level of the West Colusa has been cut. At the Mountain View crosscutting is in progress at the 1400 level and sinking has been temporarily suspended. Sinking is also in progress at the East Gray Rock from the 1400 level. Much water has been encountered and considerable difficulty is experienced from this cause.

Weekly *Miner*: The preliminary work about the two properties of the Granite Mountain Bimetallic Co. is nearly completed. The president of the company, P. A. Fusz of St. Louis, states that the Bimetallic mill will start July 1, but that only fifty stamps will be used at first. The tramway connecting the mine and mill is in order and mining has begun. The concentrator at the mill will treat ore from the mines. It is reported that ore from the Elizabeth mine will also be handled at the mill.——The report of Mgr. W. S. Kelly of the new Elkhorn M. Co. of Jefferson county, for April, states that no prospecting was done during the month, owing to an accident to the air compressor. The amount of ore hoisted was 1608 cars, or 955 tons. At the mill eighty tons were panned, of an average assay value of 40.4 ounces. The per cent saved was 85.2. Nineteen bars, containing 27,680 ounces of silver and 17.5 ounces gold, were produced, and 150.8 tons of smelting ore ore shipped, which returned $7965. The total receipts were $23,679, and the expenses $22,-881, leaving a profit of $1298.

Helena *Independent*: In spite of the low price of silver the Moose property, of the Boston & Montana Co., have begun operations. The air compressor formerly at the Mountain View will be put in immediately, and shaft sinking will begin. The Moose has not been worked by the company since the slump in silver, although it was worked a few months by leasers, who did fairly well. With the facilities that the Boston & Montana has for treating ore, it will, it is thought, be a paying proposition.

Boulder *Sentinel*: W. H. Burgess of Helena has leased the First Shot mine, near Basin. The First Shot was discovered last fall and worked until January, when the owners stopped on account of water. A 50-foot shaft and an 80-foot crosscut have been run without finding either wall. Over $4000 worth of ore was taken from 55 feet of the crosscut. The ore runs $90 in gold, 55 per cent lead and $25 in silver, with a little copper. He will place a hoist and pump on the property within the next thirty days. The bond is for a large amount and runs eighteen months.

Livingston *Enterprise*: The first carload of machinery for the new 10-stamp mill of the Daisy M. Co. at Cooke has arrived.——The steamer J. D. Farrell, with ninety tons of ore for the smelter, was wrecked on the east shore of the canyon above Jennings, on rough boulders.——At Iron Rod over 1000 sacks of high-grade ore are being delivered for shipment to the smelter.

The *Spokesman-Review* says that news comes from Vermillion, in western Montana near the Idaho line, that the Silver Butte mine, the property of the Kentucky and Montana M. Co., has suspended operations and is tied up with liens filed by miners and millmen who have claims for wages against the property. This property has been developed under the management of R. R Schulder and J. C. Eisenmann, and the capital has come from Cincinnati and Louisville. Over $200,000 has been spent in getting the mine developed and the mill and needed buildings erected. The property was just reaching a productive stage when the entanglement came. It is said that the trouble is due to the fact that the Eastern stockholders are unduly anxious for dividends. The development of the Silver Butte consists of a tunnel 1000 feet long and a lower tunnel 400 feet. A concentrator and an electric plant have been installed. The lode is said to be 10 to 12 feet wide in a slate formation.——D. Davenport bonded for $12,000 from Dodge & Linn the Golden Dream claim near Elkhorn, and has begun the development of the property.

SOUTH DAKOTA.

Pioneer-Times: P. L. Gibbs sold the Glenwood-Sunset group in Ruby basin, consisting of thirteen claims, to a Minneapolis company, of which F. W. Johnson is Mgr. He will commence development work immediately.

There are in the neighborhood of 500 men working in the producing mines near Dumont, and 200 are working on unproductive ground, leases and prospecting.

MICHIGAN.

On June 2nd a single share of stock of the Calumet & Hecla M. Co. was sold on the Boston Exchange for $575. The company is capitalized at 100,000 shares of the par value of $25 each, making the nominal capital of the mine $2,500,000, and the actual market value $57,000,000. This is the largest market valuation ever placed upon any mine, and is equal to the market value of all the copper mines of Lake Superior less than four years ago. In the fiscal year ending April 30, 1898, the Calumet & Hecla paid dividends of $4,000,000, and in the calendar year 1897 divided $5,000,000 in profits among its shareholders.

MISSOURI.

During the five months of 1898 the Joplin district has sold 174,201,000 pounds of zinc ore and 25,028,000 pounds of lead ore, making 4527 carloads mined and sold during that time. The amount in value is represented by $2,-500,000, making an annual amount of $6,000,-000.

ONTARIO.

The Golden Star mine, near Mine Center, has enough ore on the dump to run the 10-stamp mill day and night for over a year. This rock has all been taken out in development work and none of the rich quartz has been stoped. The shaft is down 240 feet and driving deeper.

NEW MEXICO.

Silver City *Enterprise*: Every mine in operation in Grant county and vicinity has shown improvement the past six months. This is true of gold and silver mines as well as the copper mines. The Santa Rita copper mines, which a year ago were employing not over a dozen men, are now giving employment to more than 150 miners. Every miner is making big pay, leasing from the company on royalty, and before the year expires there will probably be twice as many miners employed in these mines. At Pinos Altos the Hearst people, known as the Pinos Altos G. M. Co., have about 150 miners employed in developing the gold mines of the company; the result of the development work has exceeded the expectations of the owners. When the mines are fully developed and proper reduction facilities built, the mines will give employment to at least three times as many men as at present. At Mogollon, the Confidence mine is a profitable property, and at the mill an extensive and economical water power system has been completed, insuring cheap facilities for reducing the ores.

COLORADO.

BOULDER COUNTY.

The Laramie County Tunnel Co. near Caribou has a vein 12 feet wide, with an average value of $25 ore. About 100 tons are ready for shipment.——The St. Louis is again in operation and has fifty tons of $20 ore, five tons of $60 ore, and about 2½ tons of 10-ounce ore for shipment.——The Monitor will ship from 80 to 100 tons of $20 ore for the month of June.——The Silver Point has considerable low-grade ore on the dump, which will probably be shipped for treatment.

Post: Kansas capital has purchased a two-thirds interest in the Pride of the West mine at Ward for $10,000.

In the Sweet Home tunnel, Sunshine district, in going 100 feet there have been exposed two veins. One varies from 2 to 5 feet in width and averages $30 per ton. A 3-inch streak of sylvanite and rusty gold runs from $800 to $1000 per ton. The tunnel will develop eight claims.

CHAFFEE COUNTY.

The New Year of Granite will put in a 5-stamp mill. There are now five paying mines in this section, the Belle of Granite, the New Year, the Magenta, the Robert George and the D. C. Campbell.

CLEAR CREEK COUNTY.

Leasers at the Toledo at Idaho Springs made some carload shipments of ore that averaged about $60 per ton. The first-class has not yet been moved, but it is expected to run about $125 per ton.——Seidler & Co., working in the Little Albert mine, have opened a body of smelting ore that runs three ounces gold.——The Eclipse mine has been bonded to Owen & Burns for $40,000.

The Knickerbocker tunnel is pushing ahead, and in 100 feet more will be under the Emerson shaft, from which pay ore was taken. The tunnel is in 1400 feet, 300 being on the Emerson vein, and will reach the main shaft of the Crown Point-Virginia in about 1400 feet.

EL PASO COUNTY.

Telegraph: At Cripple Creek the Lillie shipped 300 tons of ore, and has ground opened to guarantee this output and the dividend at the present rate for many months. The average of the ore is running about three ounces, although the mine produces some high-grade stuff.——J. Fitting has developed the Lafayette into a steady shipper. The second-class ore he is saving runs better than five ounces and the first grade about $500 per ton.——Potvine & Vane, leasing on the Christmas, will output this month fully 500 tons, and a fair estimate of its value will be $30,000.——The output of the Last Dollar in May was in the neighborhood of 1000 tons, 700 of which was of mill grade running at least $25 per ton. The balance was sent to the smelters and ran in carload lots from $60 to $200 per ton. The gross value of the product was not less than $40,000; the profits were fully $10,000. The shaft is over 500 feet deep.

The Moon-Anchor is producing at a heavier rate than ever in its history; it is stated that the output, which has been running at from 500 to 800 tons for months, will reach the 1000-ton mark for June.——Twenty tons of ore shipped for sampling by the Little May mine will average a little more than two ounces per ton. The rock comes from a vein between 3 and 4 feet wide.

Denver *Post*: The following list shows some of the shipments from Cripple Creek mines for one week: Work, 12 tons, average $22.80 per ton; Raven, 78 tons: Anchoria-Leland, 125 tons of smelting ore: Portland, 800 tons, the highest grade not shipped yet; Pharmacist, 62 tons of $100 ore; Lafayette, small shipments running from $100 to $500 per ton: Bankers, 75 tons running from $24 to $36 per ton: Republic, 62 tons of $40 ore; Garfield Con., about 100 tons of $100 ore and several tons of $1000 ore: Vindicator, 60 tons taken out in development work; Lillie, 300 tons; Moon-Anchor, 250 tons, of which 180 tons were smelting and 70 milling ore; the Strong, Gold Coin and Independence keep up the regular output. Six feet of $60 ore is exposed in Keith's lease on the Vindicator, from which a carload of ore is shipped every other day.——The Mattie L. is outputting ore that brings in $12,000 per month. One carload shipped in April brought $20,000.

The annual statement of the Matoa G. M. Co. of Cripple Creek shows cash receipts $182,056.27: cash on hand, $27,176.45, and no debts. The company has received as royalty from lessees $36,093.78. They own sixty and one-half acres.

GUNNISON COUNTY.

The Crystal Mountain mine, near Crystal, made a strike of copper and lead ore, which also carries silver and some gold. The tunnel in which the ore has been found is in 1300 feet and the stoping ground is extensive.

GILPIN COUNTY.

The 300 and 400-foot levels of the Gaston mine are cleaned out and ready for new contracts. Stoping ore is in sight from the 150 to the 300-foot level and it is thought the ore chute is continuous from the 100 to the 300-foot level. It is proposed to sink 100 feet deeper and connect with the 600-foot level of the Saratoga.

LAKE COUNTY.

The Bull's Eye mine near Leadville continues heavy shipments to the smelters.——It is given out by the Home M. Co. that plans are nearly completed for resuming work in the down town properties.

LA PLATA COUNTY.

The Neglected mine and mill in the Oro Fino district are demonstrating that the ores of the district, which as a rule are low grade, can be made to pay by proper treatment. Much of the ore is free, but all of it carries tellurium and makes a rich concentrate.

SAN JUAN COUNTY.

The Shenandoah, near Silverton, besides supplying the concentrating plant with twenty-two tons of second-class ore daily, is outputting thirteen tons of first-class mineral weekly, which is shipped to the smelters.——Ten tons of Bonner ore was shipped by the Abbotts, which returned 9½ ounces gold and 25 ounces silver to the ton.——Three cars of ore were shipped from the Shenandoah, Solomon mountain, the value of the product being 12-100 ounces gold, 63 ounces silver and 38 per cent lead.

In the Evening Star mine, Picayune gulch, there is a 3-foot streak of ore blocked out 80 feet high and 125 feet in length. There are two distinct classes of ore in the vein. The lead streak carries 98 ounces silver, two-thirds of an ounce gold and 20 per cent lead. The copper streak carries 88 ounces silver and 8 to 12 per cent copper.

SAN MIGUEL COUNTY.

The Butterfly mill, near Ophir station, which has been in course of construction since last November, when the Anglo-Continental G. Co. purchased the Terrible and Butterfly group of mines for $190,000, has been put in operation. The mill comprises thirty stamps with amalgamating and concentrating attachments, and has a capacity of 100 tons daily. During the summer and fall it will be operated by water power, and in the winter by electricity.——Eleven properties in the Ophir district have so far this season shipped 270 cars of mineral, about sixty-five of which were concentrates, each ton of concentrates representing from five to eight tons of crude ore.

The Japan mine in the Telluride district is working 100 men, and steadily increasing its output of concentrating ore. Every week they ship from three to four carloads of concentrates to the smelters.

ARIZONA.

The United Verde, near Jerome, has for the last eight months been shipping copper, running over 90 per cent at the rate of over 3,-000,000 pounds a month, to New Jersey. The company employs 700 men. Besides copper, the United Verde produces about $1,000,000 in gold and silver. The property pays about $4,000,000 annually over all expenses.——The Wicks & Allison Gold Bonanza, near the Fresnal, continues to produce rich gold ore. The last shipment of less than one and a half tons gave a profit of over $750 gold.——The Arizona Copper Co., at Clifton, last year treated 128,-886 tons of ore, yielding an average of $10.50 per ton. The average expenses were: Mining, $3.50; smelting, etc., $4.40; leaving a profit of $3.21 per ton.

Phœnix *Republican*: H. P. Griswold has leased the Red Cloud silver and lead property near Norton's Landing, and will at once begin taking out ore. The Red Cloud property is said to be one of the best developed mines in Yuma county, having been sunk to a depth of 600 feet, and a number of drifts run. There is a ten-stamp mill and a concentrator on the property which will be placed in action at once and soon begin the shipment of concentrates.——In Cajon canyon in the Altar district, near Cerro Colorado, the Amarillas mine is producing satisfactorily. The property is operated under bond by Gibson & Bartleson. The ledge is from 4 to 10 feet in width, and the ore is milling gold rock. There are eight shafts, from 50 to 200 feet in depth, with other development work. The mill will be started next month.——G. C. Austin has taken a lease on the Green Linnet mine Union Basin, for eighteen months. He will run a tunnel 275 feet, expecting to tap the vein at a depth of 250 feet.

Prescott *Miner*: Reports come from Lynx creek that in the shaft at 200 feet depth in the Favorite mine is a solid body of ore six feet in width of good grade.

An extensive copper strike is reported on the Montgomery lode, near Globe, by the Black Warrior Copper Co. Twenty tons are daily sent to the smelter at Globe.

Phœnix *Republican*: W. A. Rowe has bonded his Lynx creek mines, near Prescott, to Eastern capitalists.——New placer diggings are reported to have been discovered on Lynx creek. The gold is coarse.——After fifteen years of vicissitudes the Storm Cloud group of fourteen mines, near Prescott, are proving to be good producers. —— Reports come from the Favorite mine that it has a solid body of ore 6 feet in width. The shaft is 200 feet deep. The ore is of good grade.——J. Brockman, Gen. Mgr. of the Commonwealth gold mine at Pearce, paid $3500 for one-fourth interest in a group of gold claims in the Baboquivari district, Pima county. The properties are being developed.

MEXICO.

The Mexican Ore Co. at Hermosillo received from Pilares, in the Moctezuma district, a shipment of ore which ran 6000 ounces of silver to the ton.

Oasis: Wadsworth & Wilbur made a shipment of ore from the Sevillano mine, which they are working under bond and lease near Willard station. They are taking out ore which carries lead and silver.——It is credibly stated that the litigation over the mines at Lampazos, operated a long time by the Moctezuma & Cleveland M. Co. of Cleveland, Ohio, has terminated in a decree of the Supreme Court of the Republic favorable to the Cleveland company; and it is anticipated that operations will be resumed by that company upon the scale formerly prevailing. The mines are rich in silver.

Cheaper Way of Sending Circulars.

DURING the recent Miners' Convention in San Francisco it was noticed that some firms dealing in mining machinery issued circulars that were supposed to be distributed throughout the hall; but of that, probably the janitor of the hall who removed the debris could tell better. It is also noticed that some firms in San Francisco and elsewhere now and then get up circulars that they mail, mostly to men who moved from the place a year ago.

It was supposed that everybody understood what a waste of money is always involved in issuing circulars—whether distributed by hand or sent by mail; and while it is evident that those who get out circulars really want to advertise, it is equally evident that they don't know how to get at what they do want. As there appears to be a few (mostly believers in "mining directory" lists) who still think that a circular is a good thing and forget that the circulars that they send out, even when received, are always accorded the same fate that they themselves give to any circular that they receive, namely, throwing it away unread, it is deemed advisable to suggest to them a way in which they can have their circulars do them some good.

To those who have mining machinery for sale, or who want to reach the mining world, and feel disposed to cling to the ancient notion of circulars sent by mail at random to probable or possible customers, it is suggested that they can, without doing violence to their established notions, secure better results in a better way. The following tells them how it can be done, being an illustration of how to do effective circular work at a greatly reduced cost. There are very few circulars that contain more than can be prominently displayed in one page of this paper:

7,500 good circulars, well printed on fine paper, cost, say,	$ 18 75
Envelopes for same,	6 75
Addressing them,	5 50
Postage (sealed envelopes),	150 00
Total,	$181 00

Thus we find that to get 7,500 circulars into the postoffice costs $181.00. This is on the supposition that the 7,500 names to whom the circulars are addressed are those of men likely to be customers of the concern sending the circulars, which is very unlikely, as no one firm can secure a live list of possible customers that would equal in value a list containing the same number of subscribers of a good live paper that is bought and paid for and seen every week and passed around until in many cases it is worn out from the number of readers through whose hands it goes. Now, instead of spending $181.00, which is mostly thrown away, how would it do to take the same circular and put it on one page of the MINING AND SCIENTIFIC PRESS, the cost of which in place of $181.00 would be $42, or less than one-fourth of $181.00, with a hundred times the greater likelihood of value? The manufacturer or dealer in mining machinery who will spend $181.00 in an attempt to get his business before 7,500 people, could save $139.00 by putting that same circular on one page of this paper and be sure to get it before 7,500 definite, known men, thus securing a certainty instead of an uncertainty and at less than one-fourth the cost of the old way.

If a circular is so good a thing as some seem to imagine, here is a chance for them to make money and save money at the same time and to get what they want at very little cost, and in place of firing a scattering shotgun, they can shoot with a rifle and concentrate all their ammunition that way.

In figuring on the cost of these circulars it is assumed that each one is sent sealed, which involves a two-cent stamp; but even were they sent unsealed they would still cost one cent apiece for postage, which would make them cost $106.00. Herein we show how lovers of circulars can substitute certainty for uncertainty and at far less cost to themselves. The force of these remarks lies in their personal application.

San Francisco, Cal.... MINING AND SCIENTIFIC PRESS, 330 Market St.



PERSPECTIVE VIEW OF FURNACE.

PARKE & LACY CO.,

21 & 23 FREMONT ST., SAN FRANCISCO., CAL.

Mining Machinery & Supplies.

Sole Licensee for the Manufacture and Sale of the

ROPP STRAIGHT LINE FURNACE

FOR ROASTING, CHLORINATING AND DESULPHURIZING ORES.

Extracts from Letters Received from Mr. Philip Argall, Manager the Metallic Extraction Co., Cyanide, Colorado:

January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.19% sulphur, and doing excellent work; in fact it has improved right along and we are highly pleased with it.

"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The ROPP FURNACE is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah, one furnace; The Metallic Extraction Co., Cyanide, Colo., one furnace; The Colorado-Philadelphia Reduction Co., Colorado City, Colo., three furnaces; The Selby Smelting & Lead Co., Selby, Cal., two furnaces; The Mount Morgan Gold Mining Co., Rockhampton, Queensland, one furnace; Broken Hill Proprietary Co., Broken Hill, New South Wales, four furnaces; Puget Sound Reduction Co., Everett, Washington; Colorado Ore Sampling & Reduction Co., Cripple Creek, Colo.; Consolidated Kansas City Smelting & Refining Co., for the Arkansas Valley Smelting Works, Leadville, Colo.; Robert Lanyon's Son's Spelter Co., Iola, Kansas (two furnaces); Mountain Copper Co., Ltd., Keswick, Cal.

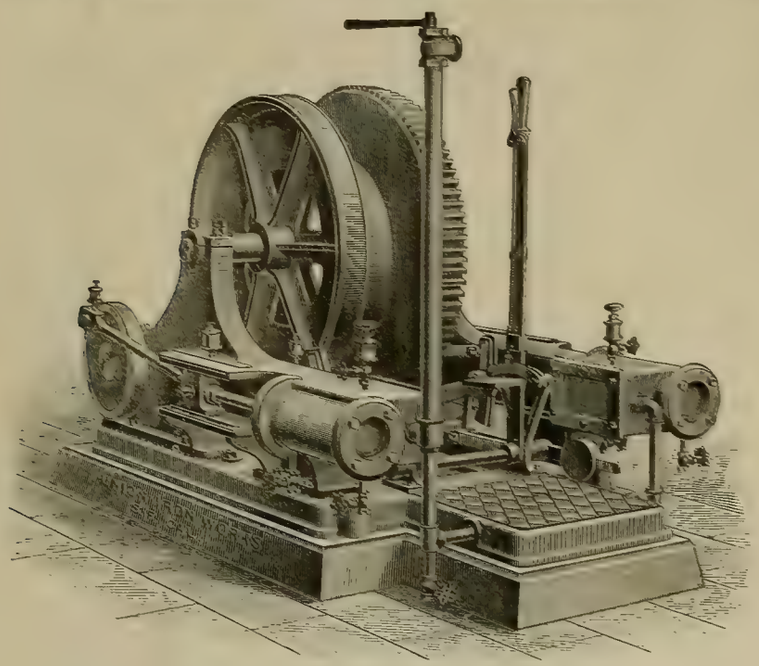
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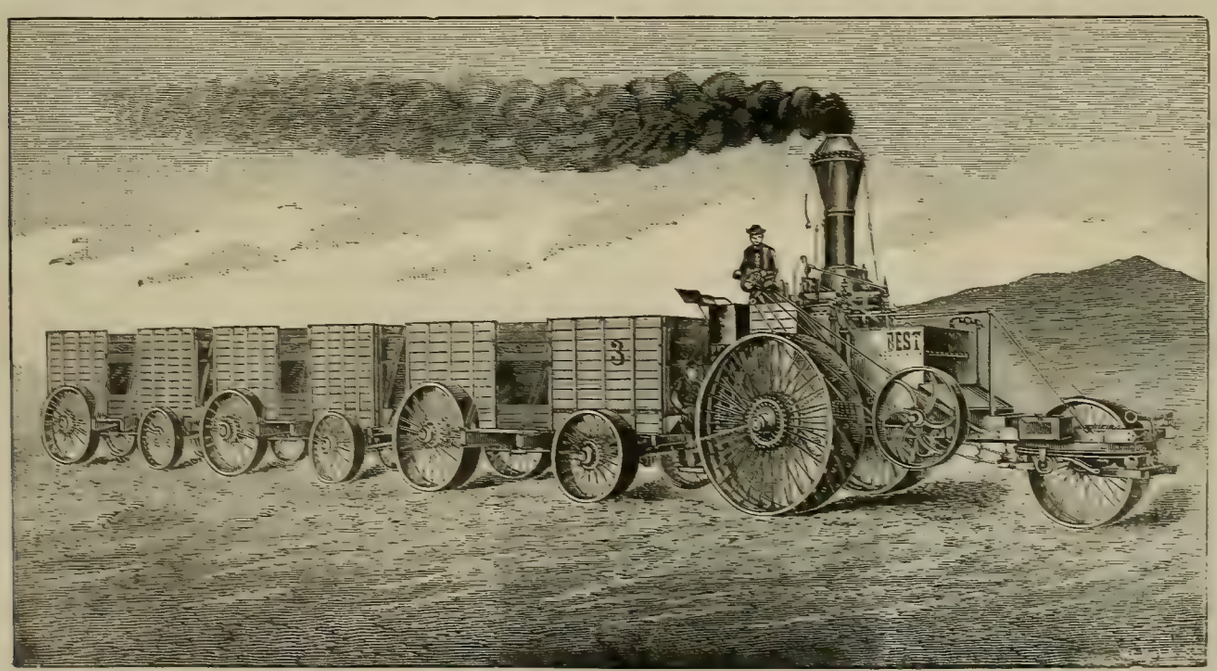
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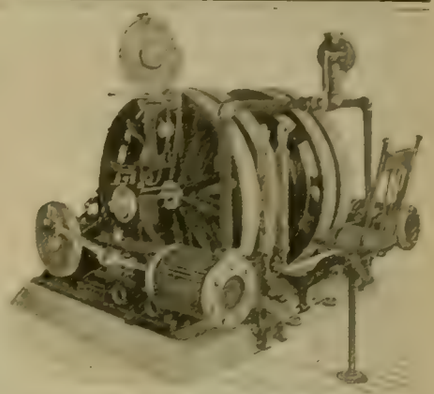
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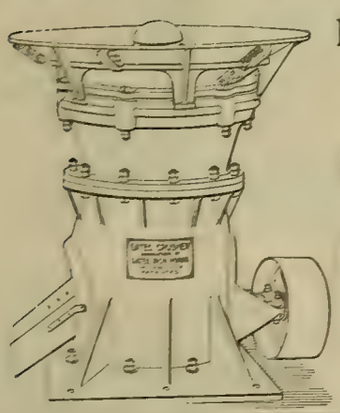
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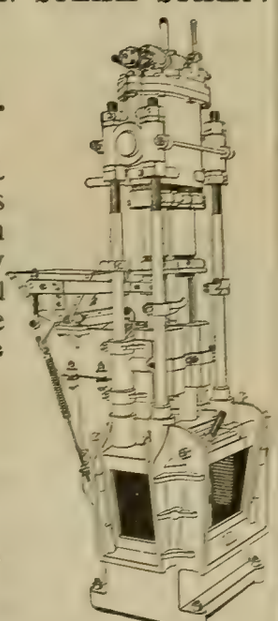
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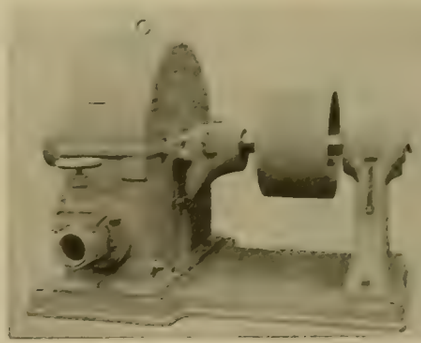
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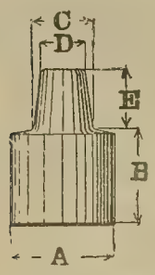
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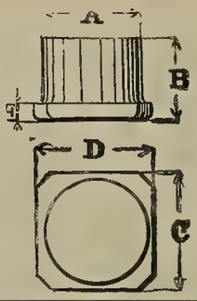
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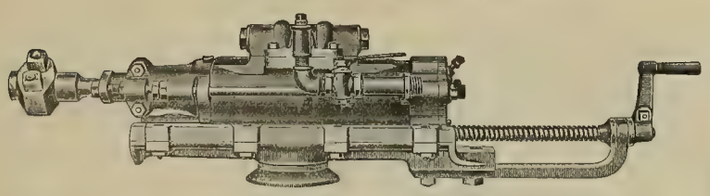
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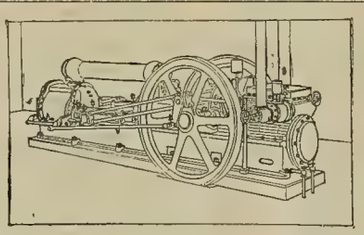
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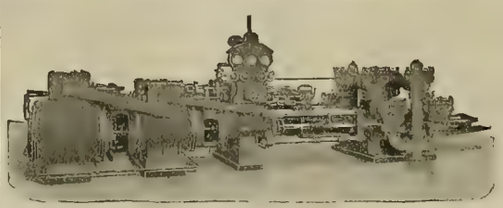
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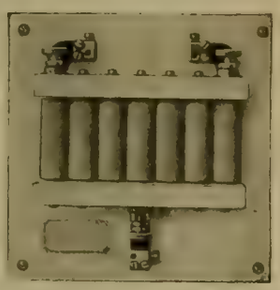
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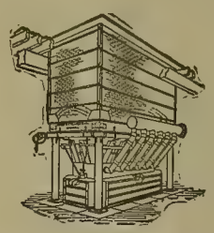
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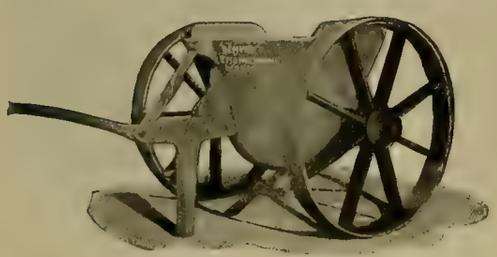
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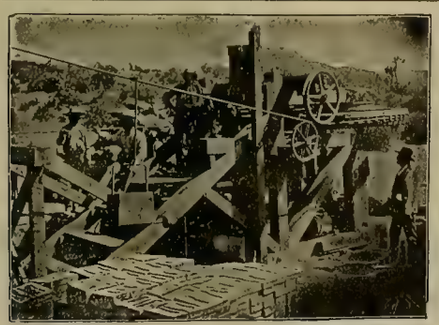


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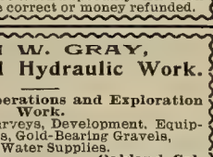
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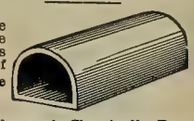
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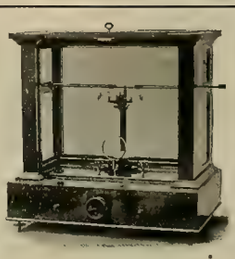


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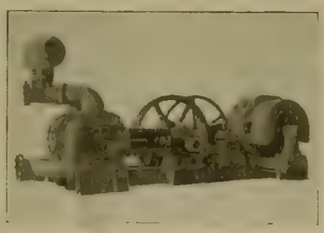
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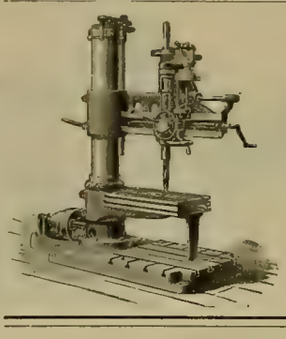
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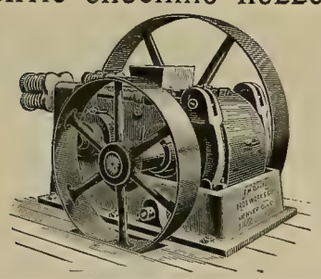
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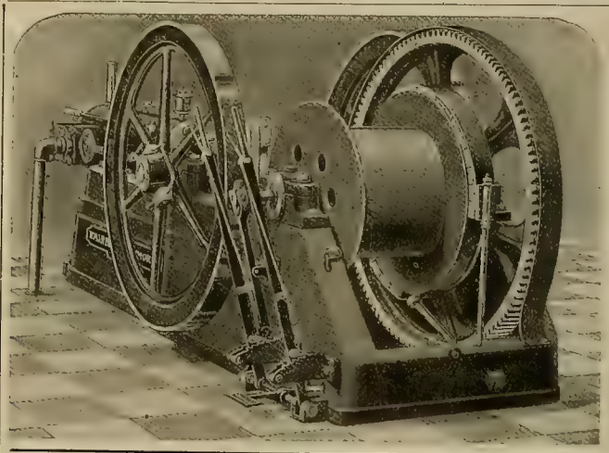
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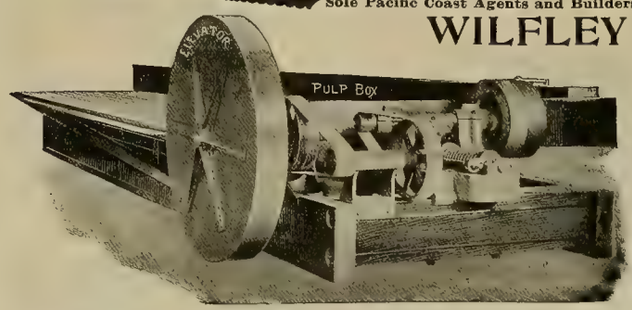
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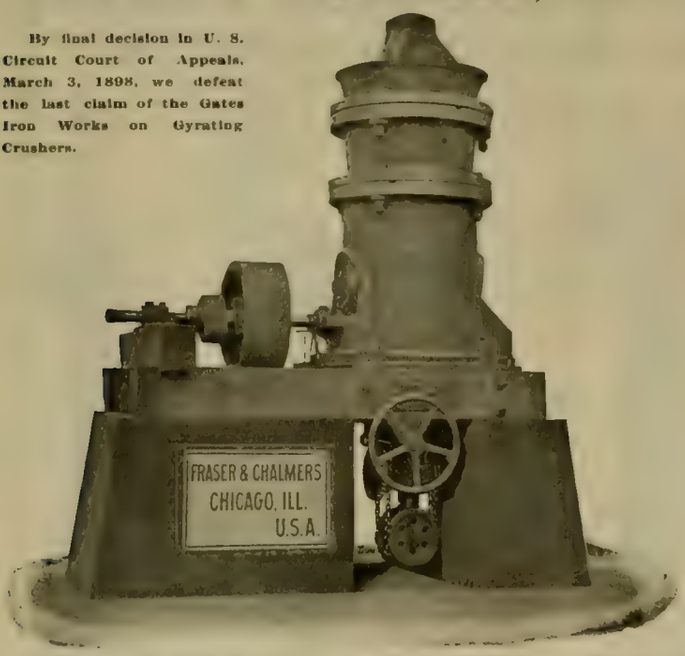


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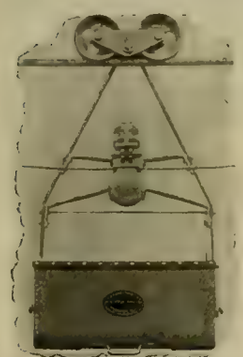
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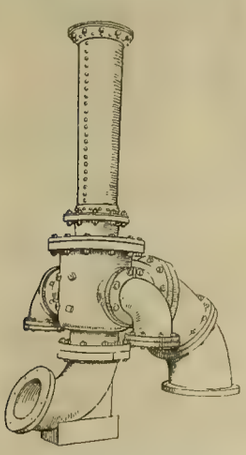
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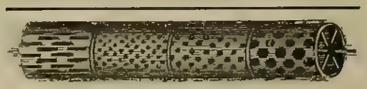
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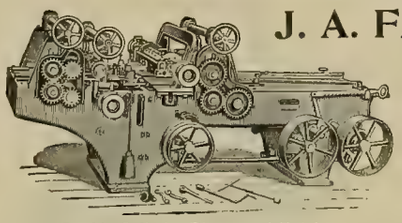
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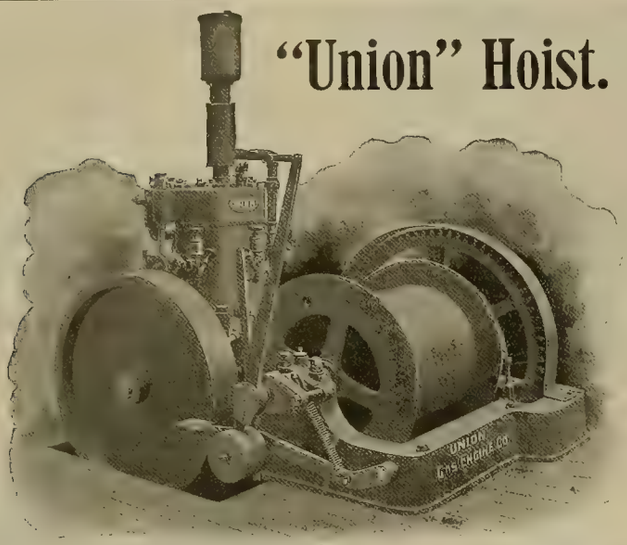
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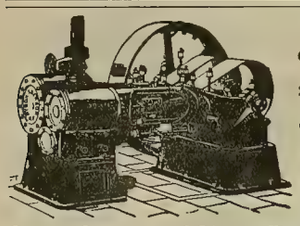
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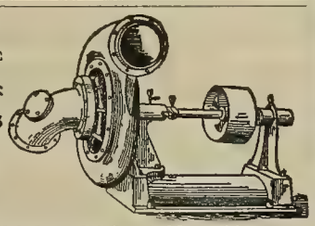
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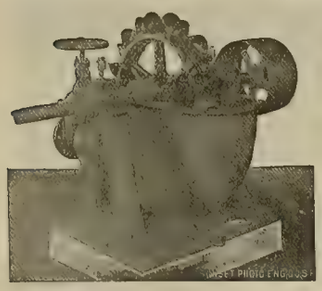
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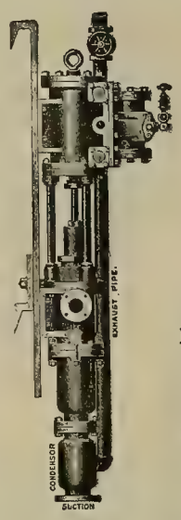
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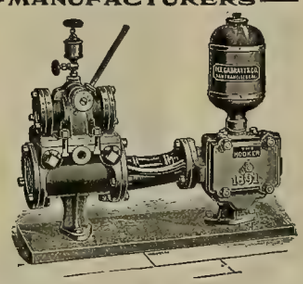
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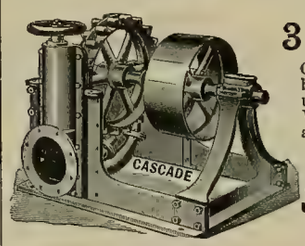
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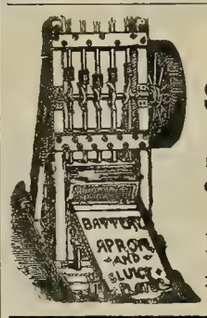
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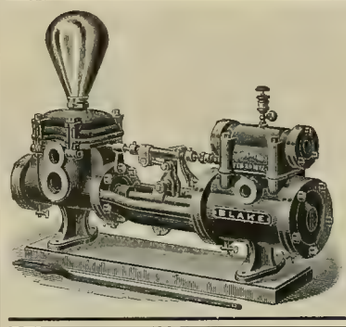


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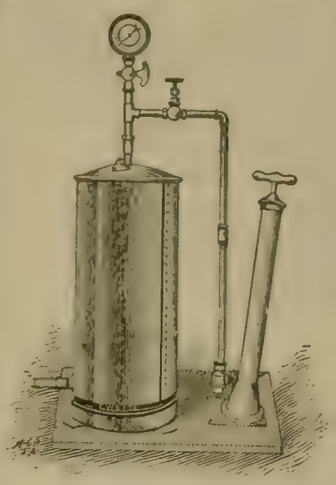
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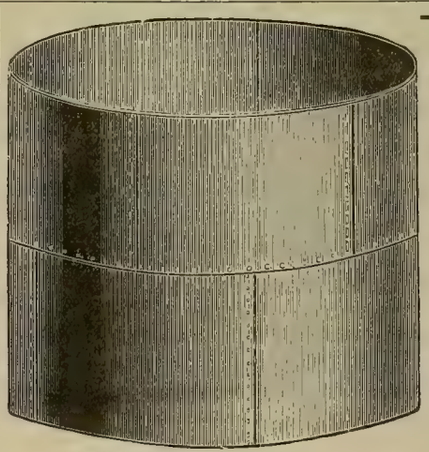
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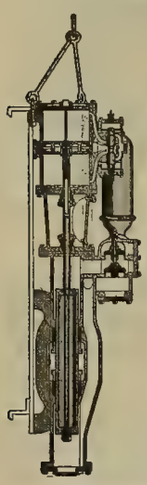


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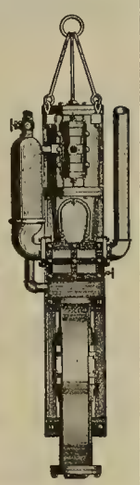
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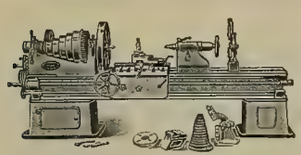
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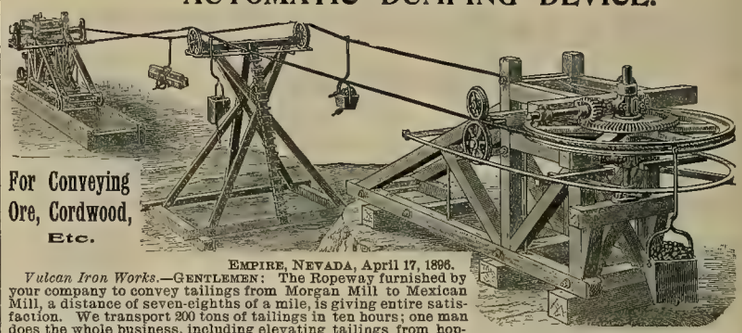
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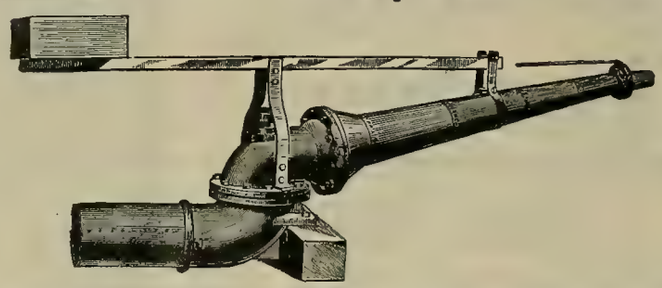
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WANTED.—Superintending Mining Engineer for Rhodesia, South Africa. Must have thorough technical and practical knowledge of gold mining and milling. Address, with full particulars, "F. B.," Mining and Scientific Press.

AMERICAN MINING ENGINEER, in the employ of a wealthy syndicate wants a good gold, gold and silver, silver-lead or copper property in the Western States or Northern Mexico, upon which considerable development work has been done. Will take up on lease and bond or put up a plant for an interest; or, if considerable ore is in sight, will buy on equitable basis. Send full particulars of mine, amount of water, timber and fuel available, transportation facilities, standard wages, etc.
Address A. N., Mining and Scientific Press.

Position Wanted by a Mining Engineer.

Am thorough assayer and amalgamator and can fill any position about mine or mill. Have complete set of engineering instruments and assay outfit. At present am manager of gold mine in California and will be at liberty about July 10th. Al letters from present employers. Address P. L., care Mining and Scientific Press.

Position Wanted as AMALGAMATOR.

By a man who has had eighteen years' practical experience. Is willing to go anywhere and is not afraid of work. Can give the best of references. Address "K. L.," care of this office, by mail or telegraph.

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1 Challenge Feeder;
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Houghton, Michigan.

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Second: In addition to this we have resident attorneys in Washington, of long experience and high standing with the office, who attend EXCLUSIVELY to our business before the Patent Office. You have, therefore, the advantage of personal consultation in the preparation of the case, and constant attention to your application after it has been filed.

Third: Time is saved. If you send to an Eastern attorney you must depend upon your ability to write a perfect explanation to a person three thousand miles away, wait until the papers can be returned to you for signature, and then send them again to your agent to be filed, if they are fortunate enough not to need further revision and return.

Experience in preparing patent applications here and in the East has proved to us that superior work can be done here.

We have been credited with obtaining more patents in proportion to the number of applications made by us than any other firm in the business.

We have had a continuous experience in this business of over thirty years. We have the most complete Patent Library west of the Mississippi river, including full certified copies of all patents issued for the past twenty-five years. We keep these for free examination by any one who desires.

We attend to all business connected with patents, such as the preparation of Caveats, Trade-Marks, Design Patents, Assignments, Licenses and Agreements. We make examinations as to the patentability of inventions, searches and opinions as to infringements, or the scope or validity of Patents. Our Branch Offices and arrangements for Foreign Patents, Trade-Marks, etc., are very extensive and complete.

DEWEY, STRONG & CO.,
330 Market St., San Francisco, Cal.

Government of Western Australia. Coolgardie Water Supply.

RIVETTED STEEL PIPES.

The Government of Western Australia is prepared to receive tenders for the supply and delivery in Western Australia of about

246 Miles of Rivetted Steel Pipes

of about 31 inches internal diameter.
Form of Tender, with Drawings, Specification and Conditions of Contract annexed, may be obtained on payment of a fee of Two Guineas in Europe at the office of the Agent-General for Western Australia, 15 Victoria street, Westminster, London, S. W.; in America, at the office of Messrs. Seward, Guthrie & Steele, 40 Wall street, New York; and in Western Australia, at the office of the Honorable the Director of Public Works, Perth.
Tenders sealed and endorsed "Tender for Rivetted Steel Pipes" are to be delivered addressed, either to the Agent General at his office aforesaid, or to the Honorable the Director of Public Works at Perth, Western Australia, on or before 12 noon, on

Tuesday, the 23d Day of August Next.

No tender will be considered unless on the prescribed form without being detached from the Specification and Conditions of Contract.
The Government does not bind itself to accept the lowest or any tender.
By order of the Honorable the Director of Public Works. C. Y. O'CONNOR, Engineer-in-Chief.
Public Works Office, PERTH, Western Australia, May 20th, 1898.

Government of Western Australia. Coolgardie Water Supply.

WELDED STEEL PIPES.

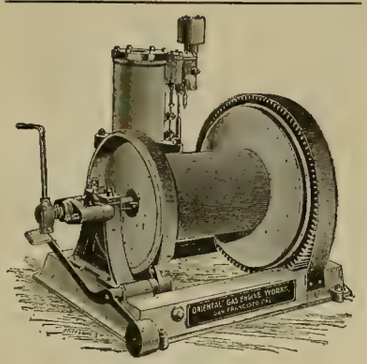
The Government of Western Australia is prepared to receive tenders for the supply and delivery in Western Australia of about

82 Miles of Welded Steel Pipes

of from 26 to 29 inches internal diameter.
Form of Tender, with Drawings, Specification and Conditions of Contract annexed, may be obtained on payment of a fee of Two Guineas; in Europe, at the office of the Agent-General for Western Australia, 15 Victoria street, Westminster, London, S. W.; in America, at the office of Messrs. Seward, Guthrie & Steele, 40 Wall street, New York; and in Western Australia, at the office of the Honorable the Director of Public Works, Perth.
Tenders sealed and endorsed "Tender for Welded Steel Pipes" are to be delivered addressed, either to the Agent-General at his office aforesaid, or to the Honorable the Director of Public Works at Perth, Western Australia, on or before 12 noon, on

Tuesday, the 23d Day of August Next.

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Public Works Office, PERTH, Western Australia, May 20th, 1898.

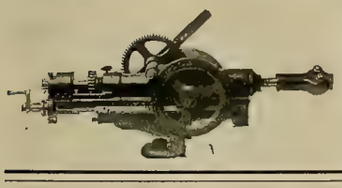


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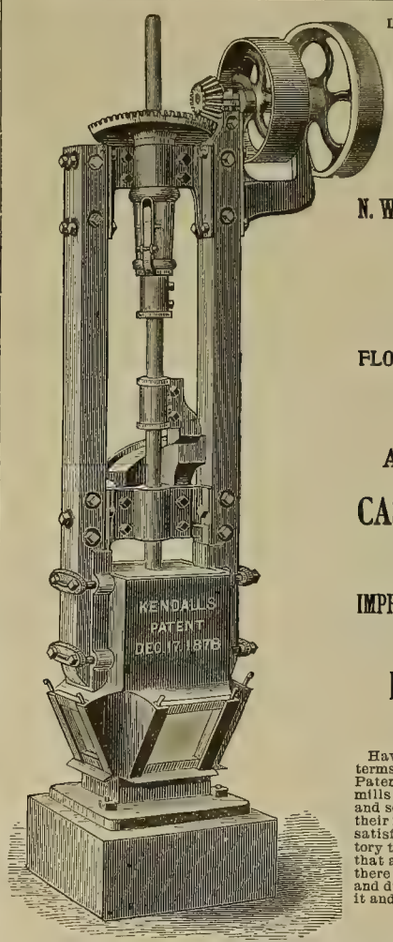
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Market Reports.

The Markets.

SAN FRANCISCO, June 23, 1898.

SILVER.—London, 27⅛d; New York, 58⅞; San Francisco, 59; nominal.

COPPER.—Lake, 11¾ and 12. For the five months ended May 31, 1898, the production of the metal in the United States aggregated 101,000 tons—34,000 tons more than was produced in the same time in 1895. Of this increase 33,000 tons more were shipped abroad this year than in 1895, the exports being 58,000 tons in 1898, against 25,000 tons in 1895. Thus, while the domestic consumption of the metal has practically stood still during the past four years, the foreign markets have taken our surplus production.

LEAD.—New York quotes 4.02½ asked; local, pipe, 5¼, 6; sheet, 6¼ and 7.

IRON.—American, soft, $20 and $22 per ton.

SPELTER.—5 and 5¼.

TIN.—Plate, American, $3.50; English, to arrive, $4.25; Pig 16c.

ANTIMONY.—9½, 10.

NAILS.—List per keg: No. 20 to 60d, wire, $2.25; cut, $2.10; 10 to 20d, wire, $2.30; cut, $2.15; 8d, wire, $2.35; cut, $2.20; 6 and 7d, wire, $2.45; cut, $2.30; 4 and 5d, wire, $2.55; cut, $2.40; 3d, wire, $2.70; cut, $2.55; 2d, wire, $2.95; cut, $2.80. In carload lots, 10c per keg less.

QUICKSILVER.—Firm and quiet; domestic, $42.50; export, $38.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$10 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

CHEMICALS.—Cyanide of potassium is quoted jobbing, 33@33¾c per lb.; carloads, 29½c; sulphuric acid, 2c per lb. for 60%; nitric acid, 7½c in carboys; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.

LUMBER.—Retail: Pine, ordinary sizes, $17@18.50; redwood, No. 1, $18@20; No. 2, $16@18.

Mining Share Market.

SAN FRANCISCO, June 23, 1898.

At present prices the entire Comstock is worth less than $500,000; time was when it was selling for $500,000,000. It is understood that there is to be a further reduction both on the street and in the mines, should both continue to be worked. Con. Cal. & Va., according to unverified statement, proposes two 10-hour shifts at $4, instead of three 8-hour. In executive session this morning, the San Francisco Stock & Exchange Board reduced the monthly salary of the chairman from $150 to $5, whereupon the incumbent resigned. The position will be filled in turn by the members. The same Board refused to consider Comstock drainage and deep mining. Unless some move in that direction is soon made, the Board may lack excuse for existence.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 23, 1898

9:30 A. M. SESSION.

100 Belcher	05	600 H. & N.	60
50 Best & Belcher	16	300 Justice	07
100 Bullion	03	500 Potosi	06
350 Con Cal & Va	23	400 Savage	04
50 Gould & Curry	10	400 Union	16

SECOND SESSION—2:30 P. M.

500 Best & Belcher	18	300 Union	17
850 Con Cal & Va	25	50 Standard	1 60
400 Savage	05	300 Yellow Jacket	16

Working Capital for Mines.

PACIFIC EXPLORATION COMPANY

Will form companies and find capital to develop mines on shares or commission. Miners who have a good prospect should write the manager of this company for particulars. Address W. E. HOLBROOK, Manager, 29-30 Chronicle Building, S. F.

Commercial Paragraphs.

DIVIDEND No. 28 of 25 cents per share on the capital stock of the Paraffine Paint Co. is payable on the 29th inst.

THE bid of Mr. Frank Brown of the Washburn-Moen Co., 8 and 10 Pine street, San Francisco, of $1877.88 for the wire necessary for the lighting of the new union ferry depot at the foot of Market street, San Francisco, has been accepted by the State Board of Harbor Commissioners.

THE Jeanesville Iron Works Co. of Denver, Colo., has furnished the Daniels & Fisher Dry Goods Co. of that city a 1200-gallon compound elevator pump, which is in operation. Mr. Middlebrook, the Denver agent for the Jeanesville Iron Works Co., writes that "it is the finest finished and smoothest running pump in Denver."

UNDER date of May 21, Ambassador Hitchcock writes from St. Petersburg to the State Department: "I am pleased to report that the Imperial Government has awarded the Westinghouse Co. a contract amounting to between $2,000,000 and $3,000,000 for the equipment of the rolling stock of its railways with Westinghouse air-brakes, and that this contract will probably be duplicated in the near future."

Assessment Notices.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1898, an assessment (No. 19) of three cents (3c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 106 Leidsdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of July, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 3d day of August, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidsdorff street, San Francisco, Cal.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of June, 1898, an assessment (No. 12) of 25 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 29, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 22nd day of July, 1898, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 12th day of August, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors

A. W. HAVENS, Secretary.

Office—Room 29, Nevada block, 309 Montgomery street, San Francisco, California.

LEON GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Winchester, Riverside County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 16th day of May, 1898, an assessment (No. 1) of 1½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 7, fifth floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1898, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of July, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.

Office—Room 7, fifth floor, Mills building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors of the Leon Gold Mining Co., the day of delinquency of the above assessment is postponed to July 9th, 1898, and the day of sale to MONDAY, August 8th, 1898.

R. L. CHENEY, Secretary.

Office—Room 7, fifth floor, Mills building, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 10th day of June, 1898, an assessment (No. 10) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of July, 1898, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 8th day of August, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

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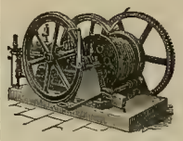
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SOLE MANUFACTURERS,

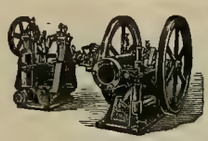
26 Cortlandt St., NEW YORK. ✦ BRANCHES: ✦ 35 Great Dover St., LONDON, S. E.

WEBER Gas and Gasoline Engine Co.,

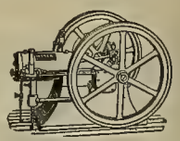
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Hoisting Engines. Pumping Plants. Stationary Engines.

CONS. ST. GOTHARD GOLD MINING COMPANY. Location of principal place of business San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of June, 1898, an assessment (No. 14) of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 113 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of July, 1898 will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 10th day of August, 1898, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. F. HOLLING, Secretary.

Office—113 Crocker building, San Francisco, Cal.

DELINQUENT SALE NOTICE.

RED CAP MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Red Cap District, Humboldt County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 27th day of April, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Harvey M. Binckley	2	1	2 00
Alice E. Binckley	20	4	8 00
Alice E. Binckley	23	20	40 00
Alice E. Binckley	24	20	40 00
Alice E. Binckley	25	20	40 00
Alice E. Binckley	26	20	40 00
Alice E. Binckley	39	1	2 00
Alice E. Binckley	40	2	4 00
Caroline S. Townsend	18	20	40 00

And in accordance with law, and an order from the Board of Directors, made on the 27th day of April, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 125 Beale St., San Francisco, California, on MONDAY, the 27th day of June, 1898, at the hour of 3 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

H. H. MARTIN, Secretary.

Office—125 Beale St., San Francisco, California.

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.....AND.....

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By C. H. AARON.

This work is written by an experienced metallurgist who has devoted many years to assaying and working precious ores on the Pacific side of the American Continent. He writes whereof he knows from personal practice, and in such plain and comprehensive terms that neither the scientist nor the practical miner can mistake his meaning.

The work, like Mr. Aaron's former publications ("Testing and Working Silver Ores," "Leaching Gold and Silver Ores,") that have been "successfully popular," is written in a condensed form, which renders his information more readily available than that of more wordy writers. The want of such a work has long been felt. It will be very desirable in the hands of many.

Table of Contents:—Preface; Introduction; Implements; Assay Balance; Materials; The Assay Office; Preparation of the Ore; Weighing the Charge; Mixing and Charging; Assay Litharge; Systems of the Crucible Assay; Preliminary Assay; Dressing the Crucible Assay: Examples of cupellation; Weighing of Bead; Parting; Calculating the Assay; Assay of Ore Containing Coarse Metal; Assay of Roasted Ore for Solubility; To Assay a Cupel; Assay by Amalgamation; To Find the Value of a Specimen; Tests of Ores; A Few Special Minerals; Solubility of Metals; Substitutes and Expedients; Assay Tables.

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